THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The difficulties consumers of iron and steel encounter in securing material to keep them in operation are an uppermost feature of the market, and buying and selling are secondary. For a considerable stretch ahead it may be expected that market reports will be devoid of records of large transactions, so largely has the production of the year both in pig iron and finished material been marketed. Each week brings evidences that consumers of pig iron are using up metal on their contracts faster than they anticipated, and fresh purchases are being made to eke out. The point has not yet been reached at which the holding up of deliveries or the resale of material is a factor; when these features do appear they will be proof of overbuying which is not now evident, though here and there reason may exist for suspecting it. Pig iron production at the rate of 337,424 tons a week on April 1, together with a reduction of over 30,000 tons in merchant stocks in March indicate consumption at the rate of over 18,000,000 tons a year when current imports are taken into consideration. If labor troubles do not intervene some increase in pig iron production may be looked for in the next few months. For the more remote future plans now on foot promise to give a very material increase in pig iron production, a number of new furnace projects, including two at Edgar Thomson, being announced elsewhere in this issue. But present and immediately future supply is a matter of some concern to both producers and consumers. It is understood that Bessemer steel manufacturers will be short a good many thousand tons of iron in the second quarter and that efforts to buy abroad have not been successful, foreign metal costing about $22 delivered at Pittsburg. For delivery in the third quarter of the year as high at $19.75 Pittsburg has been paid in the past week. Forge iron is particularly hard to get and Southern makers have little to offer for delivery this year, and as high as $16 Birmingham has been quoted. Northern gray forge is still on a basis of $18.25 to $18.50 Pittsburg. The situation in foundry iron has not improved. A number of foundries have been compelled to shut down for a day or two at a time because of delayed shipments of iron. The three Southern companies that have been trying to maintain a $12 basis for No. 2 foundry, but without offering iron in the market, have not resumed selling in the Central West and may not for some weeks. High prices are paid for iron for delivery in second and third quarters. Central Western furnaces quote $18 for the balance of the year. For malleable pig iron $19 at furnace has been paid. There is still a considerable percentage of the foundry needs for the year not provided for, but the conservative element in the trade asserts with confidence that there will be iron sufficient to go around as transportation facilities reach their full efficiency. As yet no sign appears of a slackening of operations in any direction. Interest is focused on crop prospects, and it is well understood that untoward developments there in the next few months would affect the outlook for the iron trade for 1903, and might even hold up to some extent deliveries of material before the end of the present year. The market for finished material is comparatively quiet, in veiw of the heavy contracting of some months back. Structural material is still called for beyond the ability of the mills or of dealers to supply, and some building operations are being cut off. The plate mills have been rapidly getting in the shape of the structural mills in the matter of deliveries and one Eastern mill has made an advance of $2 a ton. Some shipyard business has been offered on which the mid-summer deliveries desired could not be made. At Pittsburg a 4,000 ton contract for plates was placed in the week; and in wrought pipe a noteworthy order was for 120 miles of 20-inch pipe. The blast furnace labor situation in the Mahoning and Shenango valleys has not yet developed. No demand has yet been made for 8-hour turns and the employes seem not to be a unit on the question.

PITTSBURG.

OFFICE OF *The Iron Trade Review*, 429 PARK BUILDING, April 16.

A great scarcity of Bessemer iron for delivery up to July 1 exists, and all the large producers of steel already see that they will be short a considerable tonnage during the next three months. It is stated that the United States Steel Corporation is short no less than 40,000 tons for this period and the shortage of other steel producers will bring this tonnage close up to 75,000 tons. A number of inquiries have already gone abroad for Bessemer for a number of the larger steel interests, but the price asked for this iron, which runs as high as 3 per cent in silicon, is too high for profitable importation. None of the English iron masters would quote less than $15 to $15.50, which would bring Pittsburg delivery up to $22. The shortage of steel will be even more pronounced than anticipated and it is believed that further importations of steel will be made by the United States Steel Corporation and other large interests for delivery the next three months. Up to the present time the United States Steel Corporation has purchased nearly 30,000 tons of foreign steel, nearly all of which will be exported so that advantage can be taken of the drawback. Most of the steel will be delivered at the Allentown, Pa., plant of the American Steel & Wire Co., where it will be rolled into finished material.

The pig iron market has taken another upward turn during the week and despite the high prices a fair amount of business is being done. Foundry iron for delivery the remainder of the second quarter has sold at $21.50 for No. 2, Pittsburg, and for the second half $20.75 and $21 is quoted. Bessemer iron for delivery in the third quarter has sold at $20, Pittsburg, while fourth quarter iron is held at $18.25 to $18.50 at the furnace. Furnacemen do not appear at all anxious to sell at these prices and believe that they will be still higher before many weeks.

No definite action has yet been taken by the furnace operators on the demands of the furnacemen, but a meeting is to be held this week, when some line of action will probably be outlined. The strike of the miners of the Rochester & Pittsburg Coal & Iron Co. is expected to be settled, but the furnaces dependent upon this region for coke have been sadly crippled during the past week. Arrangements have been made however to secure coke elsewhere, and it is believed that relief can be obtained in this way.

In finished lines consumers are complaining that deliveries

on steel bars are almost as poor as those on structural material, and premiums of as high as $4 per ton have been paid this week for bars for prompt delivery. The plate market is also getting much stronger than it has been for many months and the mills in the Eastern part of this state are asking $2 per ton above the agreed price on all shipments to the West. A large order for plates, amounting to 4,000 tons for steel riveted pipe, was divided between Jones & Laughlins, Ltd., and the Carnegie Steel Co. during the week. A large order for 20-inch pipe, amounting to 120 miles, was also closed by the National Tube Co.

The scrap market is proving to be quite a problem for the smaller open-hearth plants, as the supply of the proper kind of material seems to be growing shorter and shorter constantly. The large steel producers having immense open-hearth capacity are trading good melting stock for pig iron, such an arrangement having recently been made between the Cambria Steel Co. and one of the large companies of the United States Steel Corporation. These large producers of open-hearth steel now have no scrap to offer in the market, while the railroads are now selling their steel scrap to the steel companies, receiving in exchange the equivalent in steel rails. With such an immense tonnage of old material and crop ends withdrawn from the market, it can be readily seen why the shortage exists.

The adjustment of the bar iron scales for the next year was effected at Wheeling last week, both the American Steel Hoop Co. and the Republic Iron & Steel Co. being parties to the agreement. All scales have now been signed for another year and the operation of the iron and steel mills to July 1, 1903, free from strikes and labor disturbances, is assured.

PIG IRON.—Despite the fact that the furnaces are producing more iron than at any time within the last three months, the shortage, especially in Bessemer, grows more pronounced daily. We note the sale of 5,000 tons of Bessemer iron for delivery the third quarter at $19.75, Pittsburg, and smaller sales have been made at $20 per ton. For fourth quarter delivery we note the sale of 3,000 tons at $18.25 at the furnace and smaller lots at $18.50 or $19.25, Pittsburg. The foundry iron market has also stiffened up considerably and a sale is reported of 500 tons for delivery the second half at $20.75, Pittsburg. One lot of 100 tons for delivery up to July 1 brought $21.50, Pittsburg. Forge iron for second half delivery is held at $20, Pittsburg. The two Tonawanda furnaces, Punxsutawney, Bellefonte, and one Union furnace, at Buffalo, are all suffering from the scarcity of coke, due to the strike at the Pittsburg & Rochester coal mines. One of the Tonawanda furnaces was banked for a short time, but is again in blast. Coke is now being shipped from the West Virginia and Connellsville fields. Furnaces Nos. 1 and 3, of the Shenango Furnace Co., at Sharpsville, Pa., were blown in during the week after an extended idleness, due to the shortage in the coke supply. We revise quotations as follows:

Bessemer, Valley	$18 00 to	19 25
Bessemer, Pittsburg	18 75 to	20 00
No. 1 Foundry	21 00 to	22 00
No. 2 Foundry	20 75 to	21 50
No. 3 Foundry	19 50 to	20 00
Gray Forge, Pittsburg	19 50 to	20 00
Chilled Basic, Valley	18 00 to	18 50
Chilled Basic, Pittsburg	18 75 to	19 25

STEEL.—There is little buying of foreign steel at present and transactions in domestic steel are extremely limited owing to its scarcity. Bessemer billets are quoted at $32, Pittsburg; sheet bars at $33.50 and $34 per ton. Foreign steel commands about the same price delivered, Pittsburg. Bessemer rods are extremely scarce and are quoted at $36 to $37 per ton at mill, Pittsburg.

FERRO-MANGANESE.—The domestic market continues strong at $52.50 per ton for 80 per cent, delivered at buyer's mill. Foreign manganese is quoted at about $50 per ton.

SPELTER.—The spelter market continues firm and is still advancing. We quote prime Western grades at 4.35c to 4.37½c, Pittsburg.

MUCK BAR.—The market is exceedingly strong and we note the sale of 10,000 tons at $33.50, Pittsburg.

SKELP.—The demand for both kinds of skelp is only fair, but prices remain firm owing to the high ruling quotations of ram material. Iron skelp, both grooved and sheared, is quoted at 2.05c to 2.10c, and steel at 2c to 2.05c.

RAILS AND TRACK MATERIAL.—The demand for small lots of standard section rails is large and dealers are enabled to secure from $30 to $32 per ton for small and fair sized lots. Agreed quotations remain unchanged as follows: Standard sections, 50 pounds and over, in lots of 200 tons and over, $28; car lots and less than 200 tons, $30; less than car lots, $32; light rails, 8 pounds, $45; 12 pounds, $42; 16 pounds, $39; 20 pounds, $37; 20 pounds, $35; 20 to 40 pounds, $33. Track material: Spikes, 2c to 2.05c; track bolts, square heads, 2.50c; hexagon heads, 2.65c; fish plates, 1.60c.

PLATES.—An order for 4,000 tons of plates was placed here this week and a large number of smaller orders that have been received during the past ten days put the plate market in an exceedingly healthy condition. Eastern mills are securing $2 above the pool price on all shipments West and are securing these prices for prompt deliveries. We make the following quotations: Tank plate, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches wide, 5 cents extra 100 pounds. Plates 3-16 of an inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

PIPES AND TUBES.—The National Tube Co. was last week awarded a contract for 120 miles of 20-inch pipe, which is one of the largest orders placed in many months. The market is very strong and an immense amount of business is being placed. We quote the following discounts to jobbers in carload lots, Pittsburg:

MERCHANT PIPE.

	Black. Per cent.	Galv. Per cent.
⅛ to ⅜ and 11 to 12 inches	60	48
½ to 12 inches	67	55

Discounts below are to consumers, carload lots, Pittsburg:

BOILER TUBES.

Steel

	Per cent.
1 to 1½ inches	47½
2¼ to 5 inches	65½
1¼ to 2¼ and 6 to 13 inches	60

Iron.

	Per cent.
1 to 1½ and 2¼ inches	41½
1¾ to 2¼ inches	43
2¼ to 13 inches	53

CASING.

	S. and S. Per cent.
2 to 3 inches	58
3½ to 4 inches	63
4½ to 12½ inches	63

BARS.—Steel bars for prompt delivery remain very scarce and premiums of $4 per ton have been paid during the week for prompt deliveries. Hoops and bands in lots of less than 250 tons have been advanced $2 per ton. We revise quotations as follows: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under three inches, 1.70c; over 3 inches, 1.80c; bar iron, 1.70c to 1.80c, Pittsburg, with full freight added to point of delivery. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots; refined iron bars, 2c and upwards.

SHEETS.—The demand for galvanized sheets is reported strong and a large amount of business is being placed not only with the largest producer but with the independents as well. Quotations remain unchanged as follows: Nos. 10 and 12, 2.40c to 2.50c; 14 and 15, 2.50c to 2.60c; 16, 2.60c; 18 and 20, 2.70c to 2.80c; 22 and 24, 2.80c to 2.90c; 26, 2.90c to 3c; 27, 3c to 3.10c; 28, 3.10c to 3.20c; 29, 3.25c to 3.35c; 30, 3.35c to 3.45c. Galvanized sheets, in carload lots to consumers, are quoted at 3.05c for Nos. 10 and 11, 3.45c for Nos. 18 to 21; 4.20c for No. 27, and 4.50c for No. 28.

STRUCTURAL MATERIAL.—Dealers in structural material are securing 2.75c and 3c for small lots of material for prompt delivery, while it is almost impossible to secure material for shipment before December from the mills. Agreement quotations remain unchanged as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 6 inches, 1.60c; universal mill plates, 1.60c.

WIRE AND WIRE NAILS.—The demand for wire and wire nails is reported by jobbers to be unprecedented this spring. The demand for cut nails, despite the fact that the price is almost as high as that of wire nails, is also reported good. Our quotations are as follows: Wire nails in carload lots, $2.05

per keg; smaller lots, $2.10 and $2.15; plain wire, $2 in carload lots and $2.10 in less than carload lots to retailers; galvanized wire, $2.40 in carload lots; polished staples, $2.20, and galvanized staples, $2.60; painted barb wire, $2.60, and galvanized, $2.90. These prices are quoted on a Pittsburg base, plus the actual freight to destination. Cut nails are held at $2.05 in carload lots and $2.10 in less than carload lots, Pittsburg, plus freight to destination.

MERCHANT STEEL.—At a meeting of the shafting manufacturers, held here last week, the proposition to advance prices $5 per ton was voted down and no change was made. Quotations remain unchanged as follows: Turned, cold rolled and ground shafting in carload lots is quoted 50 off, and in less than carload lots, 45 off; tire steel, 1.70c in carload lots and 1.80c less than carload lots; toe calk, 2.10c to 2.25c; sleigh shoe, 2c to 2.25c; machinery steel, 1.50c; smooth machinery steel, 1.75c. Tool steel, 7 cents and upwards.

OLD MATERIAL.—The scarcity of heavy melting steel continues and open-hearth manufacturers find great difficulty in securing sufficient material to operate their furnaces. Our quotations, gross tons, are as follows: Heavy wrought scrap, $21 to $21.50; cast scrap, $17.50 to $17.75; iron rails, $25 to $26; car wheels, $19; cast borings, $10.50 to $11; wrought turnings, $13.50 to $14; steel rails, $19.50 to $20; steel rails for rerolling purposes, $25.

COKE.—According to the Connellsville *Courier* the production of coke in the Connellsville region during the week ending April 5 amounted to 220,637 tons, a slight gain over the production of the previous week. There are only 760 ovens idle in the Connellsville region at the present time. The demand for coke for prompt shipment is still large, but somewhat lower prices prevail. Furnace coke is held at $2.50 per ton and foundry at $3 to $3.25. Outside coke is quoted at 25 cents per ton less than the above.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
534 MONADNOCK BLOCK, April 15.

Aside from the activity in plates, merchant steel and wire products, the market is quiet. This does not indicate, however, any falling off in business, as inquiry for all kinds of material continues very heavy. Few of the mills and furnaces in this territory can handle more business, however, owing to the large tonnage already on their books. Sales of iron bars are somewhat heavier than of steel, which is due to the fact that all the local producers are sold up on the latter for practically the entire year. Scrap maintains its firmness of last week, and sellers state they find no difficulty in finding buyers for all they have to offer.

PIG IRON.—Demand is limited almost entirely to spot iron, a few cars of which one concern has for sale each day. Buying for future delivery is light, sales of 500 and 1,000 tons being only occasionally made. With the exception of the firm referred to, all the sellers in this city are out of the market, having no iron for sale to anyone. The Minerva Furnace of the Thomas Furnace Co., in Milwaukee, which was put in blast a couple of weeks ago, has helped to relieve the situation to some extent, and another source of supply will be established some time this month when the new furnace of the Republic Iron & Steel Co., at Birmingham, Ala., goes in blast. The following quotations are for prompt delivery:

Lake Sup. Charcoal	$21 00 to $22 00	Southern Coke No. 4	$17 15 to $18 15
Local Coke Fdy. No. 1	19 00 to 19 50	Southern No 1 Soft	18 65 to 19 65
Local Coke Fdy. No 2	18 50 to 19 00	Southern No. 2 Soft	18 15 to 19 15
Local Coke Fdy. No. 3	17 50 to 18 00	Southern Gray Forge	16 90 to 17 90
Local Scotch Fdy. No. 1	19 00 to 19 50	Southern Silveries	17 65 to 18 15
Local Scotch Fdy. No. 2	18 50 to 19 00	Jackson Co. Silveries	19 00 to 19 60
Southern Coke No. 1	18 65 to 19 65	Ohio Strong Softeners	18 50 to 19 00
Southern Coke No. 2	18 15 to 19 15	Alabama Car Wheel	20 50 to 21 00
Southern Coke No. 3	17 65 to 18 65	Malleable Bessemer	19 00 to 19 50

BARS.—Though all the heavy buyers have covered for their wants, orders continue to come in quite freely. These are mostly from small consumers who buy in car load lots, yet the aggregate tonnage sold is beyond the expectations of manufacturers. Owing to the wide difference in the price of iron and steel bars, the inquiry for steel is considerably heavier than that for iron, but as all the local mills are sold up for the year on this material, consumers have to accept iron and pay the advanced rate. We quote steel, 1.75c to 1.85c, Chicago; iron, 1.95c, Chicago; hoops, 2.15c, Chicago. Out of store, 2.10c to 2.25c; hoops, 2.30c.

SHEETS.—Both mills and jobbers have decided to sell galvanized sheets on a net basis in the future, discontinuing the discount method, which has been in vogue. There is no lack of business and prices are firm. We quote No. 27 black, mill shipments, Chicago delivery, 3.15c to 3.20c; galvanized, 4.45c, Chicago; out of store, No. 27 black, 3.45c to 3.50c; galvanized, 4.70c.

STRUCTURAL STEEL.—No sales are reported by mills, and all buyers are referred to jobbers with stocks on hand. These stocks are limited and transactions are necessarily for small lots. We quote mill shipments, carload lots, as follows: Beams, 15 inches and under, 1.75c; 18 inches and over, 1.85c; structural angles, 3x3 to 6x6, 1.75c; over 6x6, 1.85c; angles, channels and tees, smaller than 3 inches, 1.85c base; plates, 1.75c; lots from store, tees, 3c minimum; beams and channels, 3c minimum with cartage charges.

RAILS AND TRACK SUPPLIES.—There is nothing new to report in these materials. Inquiries are constantly being received for standard sections, but few sales result owing to the length of time for which mills are sold up. There is a good demand for light rails, but on this product, mills are sold up for four months. Buying of track supplies would be heavy if manufacturers could promise delivery within a reasonable time, but none in this city can handle any more orders for delivery within three to six months. We quote standard sections, $28; light rails, $36 to $38, according to size; out of store, $45 to $50; splice bars, 2c; spikes, carload lots, 2.35c; track bolts and hexagon nuts, 3.10c to 3.20c; out of store, 3.30c; square nuts, base, 2.95c; out of store, 3.05c.

BILLETS.—A few small sales are reported, but as consumers have known for some months that this is a poor market for this material the inquiry is very light. We quote Bessemer billets, $38 a ton; open-hearth, $40.

MERCHANT STEEL.—Implement manufacturers have been heavy buyers in the past week, covering for their yearly wants. Prices are very firm. We quote mill shipments, Chicago delivery, as follows: Smooth finished tire steel, 1.95c to 2c; open-hearth spring steel, 2.45c to 2.60c; sleigh shoe, 1.75c to 1.80c, flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.40c to 2.60c; machinery steel, 2.15c to 2.25c, base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.25c to 2.35c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 per cent to 10 per cent higher; cold rolled shafting, carload lots, 50 per cent off, Chicago; less than carload lots, 45 per cent off, Chicago.

MERCHANT PIPE.—Trade is not very active for this time of the year and sales are confined to small lots. We quote as follows:

MERCHANT PIPE, RANDOM LENGTHS.

	Black Per cent.	Galv. Per cent.
⅛ to ⅜ in.	56½	44½
¼ to 12 in.	63½	51½

BOILER TUBES.

	Steel Per cent.	Iron Per cent.
1 to 1¾ in.	40	35
1¾ to 2½ in.	47½	37½
2¾ to 5 in.	57½	47½
6 in. and larger	45	40

CAST IRON PIPE.—Prices have again advanced $1 a ton. New business is reported as being of good proportions, and is increasing daily. We quote as follows: 4-inch water pipe, $31, carload lots, f. o. b. Chicago; 6-inch water pipe and larger sizes, $29 to $30; gas pipe, $1 a ton higher than these prices.

PLATES.—The local manufacturer reports that consumers are specifying heavily on their contracts, and that new business is of good proportions. It is accepting no orders for delivery within 90 days, as up to that time, its order books are full. We quote as follows, Chicago delivery: Tank steel, base, ¼-inch, 1.80c to 1.85c; flange steel, 1.90c to 2c; marine steel, 1.95c to 2.10c; fire box steel, ordinary, 2c to 2.10c; special, 2.25c and upward. Jobbers are selling from store according to size as follows: Tank steel, 2c to 2.10c; flange steel, 2.25c to 2.35c.

WIRE AND WIRE NAILS.—Manufacturers report that they could, without difficulty, in a very short time, sell their capacity for the entire year, so heavy is the demand for all kinds of wire products. The entire output of the mills of the local interest goes into immediate consumption, and it is about three months behind in orders. We quote as follows:

Smooth wire, carload lots, $2.15; painted barb wire, $2.75; galvanized barb wire, in carload lots, $3.05; wire nails, carload lots, $2.20; staples, carload lots, $2.30; jobbers' prices to retailers, 10 cents higher than above for carload lots, and 20 cents for less than carloads.

COKE.—Within the last three weeks there has been a marked improvement in the local receipts of coke, and sellers are now hopeful of soon receiving a sufficient supply to fully cover the needs of customers. We quote West Virginia coke, $5.50 to $6.00; Connellsville, 25 cents to 50 cents higher.

OLD MATERIAL.—Opinions of buyers and sellers on the condition of the scrap market differ. Some say that it is firm and that they have no difficulty in disposing of all the material they can get together, while others are of an entirely opposite opinion. It is true, nevertheless, that dealers are getting a price for scrap out of proportion with the price for finished material. We quote gross tons as follows:

Old iron rails	$24 00 to $25 00	Old steel rails, mixed	$17 00 to $17 50
Old steel rails, 5 ft. and up	23 00 to 24 00	Relaying rails	27 00 to 28 00
Old steel rails, 3 ft. and under	18 50 to 19 00	Old wheels	19 50 to 20 00
		Heavy melting steel	16 50 to 17 00
		Mixed country steel	14 00 to 14 50

The following are selling prices per net ton:

No. 1 R. R. wrought	$19 50 to $20 00	Steel axles	$19 00 to $19 50
No. 2 R. R. wrought	18 00 to 18 50	Cast borings	8 50 to 9 00
Dealers' forge	15 50 to 16 00	Wrought turnings	12 50 to 13 00
No. 1 busheling	13 50 to 14 00	Iron axle turnings	14 00 to 14 50
No 1 R.R. & mch. cast	13 50 to 14 00	Steel axle turnings	13 00 to 13 50
Railway Malleable	15 00 to 15 50	Stove plates	10 50 to 11 00
Country malleable	13 00 to 14 00	Old iron splice bars	21 00 to 21 50
Iron axles	24 50 to 25 00		

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, April 16.

The shipment of ore to Lake Erie ports is fairly under way, barring some difficulty with frozen ore at the upper lake docks. The new ore is coming to docks carrying heavy stocks from the season of 1901. It is found that Lake Erie docks contain fully 1,000,000 tons more of ore than it was estimated at the close of navigation they would have at this time. The serious interruptions to furnace operations throughout the past winter are responsible for the disappointing movement of ore from docks to furnaces. In addition to the ore on docks there is a large tonnage in furnace yards. The result will be that while the consumption of Lake Superior ores in the next 12 months will doubtless be greater than in the past year, the movement of ore from Lake Superior may not be as large as some estimates, based on the increase of the past few years, have made. In the case of the United States Steel Corporation it is a question if any more ore will be brought down the lakes this season than in 1901. All told there is now probably 2,000,000 to 2,500,000 tons of ore on Lake Erie docks and in furnace yards, over and above what would be considered, in ordinary times, a proper safeguard against dock strikes, late opening of navigation and other contingencies.

PIG IRON.—Dealers continue to receive inquiries for iron, with stipulations as to deliveries which they cannot meet. A good many foundries need iron for their operations between today and July 1 beyond what their contracts call for. Most furnaces are getting well sold up for the year, and their chief business now is to deal with customers who are operating from hand to mouth and on the verge of shutting down. We quote No. 2 foundry at $18, Valley furnace, though in a few cases furnaces are taking care of their trade at somewhat lower figures. Gray forge is exceedingly scarce. Southern furnaces are in very few cases in position to deliver more forge iron this year. On an inquiry for 3,000 tons the past week a Birmingham quotation of $16 was made. Bessemer iron has sold as high as $19 at the furnace for delivery in the third quarter. Valley furnacemen have not yet received any formal demand from blast furnace workers, only the reports of action taken at the workers' meetings having reached them thus far. If a demand for 8-hour turns is made it will not be granted, for 50 per cent more men cannot be had. Some interruption of production may come about May 1, but this far the movement of the union leaders has not taken shape. A new blast furnace project for Cleveland is announced this week, but the new producer will not be a market factor until the late spring of 1903. We quote Cleveland prices as follows:

Bessemer	$17 75 to $18 75	Scotch No 1	$18 00 to $19 50
No. 1 Strong F'dry	18 00 to 19 50	Scotch No. 2	17 75 to 18 75
No. 2 Strong F'dry	17 75 to 18 75	Gray forge, Valley	17 50 to 17 75
No. 3 Foundry	17 50 to 18 50	LakeSuperior charc'l	21 00 to 22 00

FINISHED MATERIAL.—In structural material and in plates there have been inquiries the past week which could not be taken care of. A new structural steel car company has been in the market for a round tonnage for delivery late in the year, but leading mills are unable to take on more business for 1902. Some further vessel building is under consideration, also, but it is found that plate mills are sold far ahead, one Pittsburg interest being practically out of the market for the year. Bars are quiet, so far as large business goes, but small inquiries are constant. Pittsburg prices of 1.70c and 1.80c are quoted for iron, and 1.60c for steel. The Cleveland price for bar iron out of store has not yet been advanced above 1.90c. Sheets have been only fairly active. The delay of open weather has much to do with holding up business in some quarters. The following prices are quoted on mill sales: No. 24, 2.90c to 3c; No. 26, 3c to 3.10c; No. 27, 3.10c to 3.20c; and the following prices out of stock: No. 10, 2.36c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.55c to 2.70c; No. 16, 2.95c to 3.10c; No. 18, 3c to 3.15c; No. 20, 3.05c to 3.20c; Nos. 22-24, 3.15c to 3.30c; Nos. 22-26, 3.25c to 3.40c; No. 27, 3.35c to 3.50c; No. 28, 3.45c to 3.60c, for one pass cold rolled. For full cold rolled .10c extra is charged. Galvanized sheets are now quoted by the pound, instead of by discounts. Cleveland prices to consumers are as follows for carload lots: Nos. 10 and 11, 3.15c; Nos. 12 to 14, 3.25c; Nos. 18 to 21, 3.55c; Nos. 22 to 24, 3.85c; No. 27, 4.35c; No. 28, 4.60c.

OLD MATERIAL.—Current prices have apparently reached high point and there are not lacking signs of easing up in several lines. Offers are more freely made, but so far no reduction has been reached. Another week under present influence may call for a revision of the list. The following quotations for Cleveland delivery are all in gross tons:

Old iron rails	$ 23 00 to 24 00
Old steel rails (6 ft. and over)	20 00 to 22 00
Old steel rails (6 ft. and under)	17 00 to 18 00
Old car wheels	16 00 to 18 00
No. 1 R. R. wrought scrap	21 00 to 22 00
Mill scrap	17 00 to 17 00
No. 1 machine cast scrap	15 00 to 16 00
Iron axles	26 00 to 28 00
Axle turnings	16 00 to 17 00
Wrought turnings (free from cast)	13 50 to 14 00
Cast borings	8 00 to 9 00
Uncut wrought iron boilers	11 00 to 12 00
Steel boiler plates	16 00 to 17 00
Grate bars	11 00 to 12 00
Pipes and flues (clean)	17 00 to 18 00
Tank iron	17 00 to 18 00
Hoop and band iron	13 00 to 14 00
Sheet iron	11 00 to 12 00
Wrought drillings	13 00 to 13 50
Malleable iron	17 00 to 18 00
Stove plate	12 50 to 13 50
Heavy steel	17 00 to 18 00

CINCINNATI.

April 16.

There has been a fair selling movement in pig iron, a heavy demand for finished material, and a continued satisfactory business in all lines allied with the iron trade. Indications now are that pig iron will not sell again at $12 for No. 2 foundry, Birmingham basis, until it has sold at higher figures. Large Southern interests that have maintained that the price of No. 2 should be kept at $12 are said to differ in their views at this time, and it is intimated that one of the large Southern producers now out of the market will, when it resumes selling, get more than $12.

Finished material is very firm and there have been some advances. Store prices are higher and mill prices on some kinds are up. The demand is very good and deliveries are very bad. The matter of cars is still worrying producers of pig iron and shippers of finished material and their customers are making loud complaints.

PIG IRON.—It would seem proper at this time to abandon all attempts to quote pig iron on the basis of $12 for No. 2 foundry at Birmingham, if the positive statement made here this week is true, that one of the largest Southern producers will sell at higher figures when it comes back into the market. In some cases these sellers promise that while they are not selling iron at the present time, when they do get back in the market they will sell at that price. This argument has been taken as sufficient for several weeks for keeping the quotations at $12. It is generally understood that the large companies have attempted to hold the price steady at $12 because of the fact that they have sold most of their product for the year at that basis. If they now allow the price to advance, it may mean an advance in the freight rate and possibly some

labor troubles. An advance in the freight rate of 50 cents per ton would mean a net price for the greater part of the year's business of $11.50 for No. 2 Birmingham. It must be explained, however, that even though the large interest referred to as likely to sell above $12 does come back into the market it will probably not be for two months or so.

There has not been a very large tonnage of pig iron sold during the past week. Orders range all the way from a car load to 1,500 tons and take in all grades for all sorts of deliveries. A good lot of No. 1 sold for July delivery at $15.75 Birmingham. Virginia white and mottled sold on a $14 basis. No. 2 foundry has sold in several instances for August and September delivery at $15 Birmingham. There was a good order placed for malleable this week at $19.50 Ohio furnace, or $21.10 Cincinnati. Of course, the business done has been mostly in small lots, but it has been sufficient to make a market at higher figures, especially since there have been no sales at the lower figures steadfastly adhered to by some interests. In view of the facts stated, prices at which iron has been selling are now quoted as follows:

Southern Fdy. No. 1	$17 75 to 18 25	Gray Forge	$16 25 to 16 75
" " 2	17 25 to 17 75	Northern Fdy. No. 1	21 00 to 21 25
" " 3	16 75 to 17 25	" 2	20 50 to 20 75
" " 4	16 25 to 16 75	Southern C. W. Iron	21 75 to 22 75
So. Fdy. No. 1 soft	18 25 to 18 75	Malleable coke Iron	20 60 to 21 10
So. Fdy. No. 2 soft	17 25 to 17 75		

FINISHED MATERIAL.—The demand for finished material shows no sign of abatement. Deliveries are slower than buyers can put up with and keep their good humor. Following recent advances in bar iron, iron stores have advanced their prices somewhat, the stocks that they had on hand bought at lower prices having been succeeded by higher priced material. Bar iron is quoted here at 1.92c and bar steel at 1.72c, store prices on both having been advanced to 2.20c. Angles have been advanced to 2.20c, and out of store they are selling at 2.36c to 2.50c. Plates remain at 1.85c; sheets, No. 28, 3.35c to 3.40c; No. 12 blue annealed, 2.35c.

OLD MATERIAL.—The market for scrap remains firm. There is a good demand for many kinds of material and there is a scarcity of most of it. The market has been pretty well cleaned up. Erie prices can be quoted as follows:

Old No 1. Wrought Railroad, net tons	$ 19 00 to 19 25
Cast Machine and Foundry, net tons	13 75 to 14 00
Old Iron Rails, gross tons	24 00 to 24 25
Old Steel Rails, gross tons	24 00 to 24 25
Old Short Lengths, gross tons	17 00 to 17 25
Old Iron Axles, gross tons	to 24 00
Old Iron Car Wheels, gross tons	18 50 to 19 50
Stove Plates, gross tons	10 50 to 10 75
Wrought Turnings, net tons	13 00 to 14 00
Cast Borings, net tons	7 50 to 8 50

PHILADELPHIA.

April 15.

The large orders for iron placed in the Central West have tended to a further hardening of the market in Eastern Pennsylvania and the difference in quotations for varying deliveries through the balance of the year is gradually disappearing. Considerable confusion exists among consumers but all are agreed that business is turning out in even larger volume than the rosy prophecies made at the beginning of the year allowed for, and the limit is not believed to have been reached. The Southern furnaces were expected to afford some relief to consumers in this section but the figures of production from that quarter show an exhaustion of stocks and oversold conditions which renders aid out of the question. Nothing which will unfavorably affect the iron and steel trades appears in sight and only a lack of material to work with prevents greater expansion.

PIG IRON.—There is no let-up in the scarcity of iron and melters are exhibiting considerable anxiety as to their ability to secure all that they need to carry them through the next few months. Orders are being placed for future deliveries at relatively higher figures than could have been obtained a short time ago and should business continue on the present scale there is every probability that material for the last months of the year will be difficult to secure in satisfactory quantities. Consumers have shown a certain amount of indifference as to their wants for this period but are gradually changing their position to one of active interest. As near as can be learned, the latest transactions covering deliveries in Philadelphia or vicinity up to July 1, have taken place within the following range of values: No. 1 X foundry, $21 to $21.50; No. 2 X foundry, $20 to $20.75; No. 2 plain, $18.75 to $19.50; standard gray forge, $18.25 to $18.75; ordinary gray forge, $17.50 to $18; Basic (chilled), $19 to $19.50. Higher figures are asked at times and lower quotations made by those who have no iron to sell. For the last half of the year it is possible to arrange for deliveries at from a dollar to a dollar and a half better than the above figures.

FINISHED MATERIAL.—Conditions have reached a point where considerable work is being held up for want of material and this will become all the more marked as the season advances and new projects make their appearance. Structural material is being looked for from foreign markets though nothing but heavy premiums will permit importation. Plates are becoming scarce, although production is very nearly equal to requirements. A local mill has advanced its price $2 a ton. The demand for bars is somewhat irregular, yet the mills in general have all they can take care of. We continue nominal quotations as follows: Plates, ¼-inch and thicker, 1.85c to 1.95c; bars, steel, 1.80c to 1.85c; iron, 1.95c; angles, 1.75c to 1.85c; beams and channels, 1.75c to 1.85c.

Discounts on Galvanized Sheets Abolished.

(Special Telegram.)

PITTSBURG, April 16.—Since April 1 the American Sheet Steel Co. has adopted the same method of quoting galvanized sheets—that is, so much per pound—that is in vogue with black sheets. Many of the jobbers, however, only started the system yesterday, April 15. The discount system is still being used to some extent by certain producers, but it is probable that all will come in time to the new method, which is simple and much more easily computed than the discount system. Quotations on mill shipments in carload lots are as follows: No. 14, 3.06c; No. 16, 3.18c; No. 20, 3.38c; Nos. 22 and 24, 3.69c; No. 26, 3.95c; No. 27, 4.20c; No. 28, 4.47c. Quotations on mill shipments in less than carload lots are as follows: No. 14, 3.25c; No. 16, 3.35c; No. 20, 3.56c; Nos. 22 and 24, 3.88c; No. 26, 4.15c; No. 27, 4.40c; No. 28, 4.67c. For shipment from warehouse jobbers ask 5 cents per hundred above the latter quotations, which may be considered the quotations to the average consumer.

Pennsylvania Steel Co.

The first annual meeting of the stockholders of the Pennsylvania Steel Co. was held at Camden, N. J., Tuesday, April 15. The report of the board of directors, submitted by President E. C. Felton, was approved. It shows the net earnings from operations to be $2,879,272, with $323,559 additional from rent and income from investments and interest. The gross income from all sources was therefore $3,202,831, from which is deducted $550,113, interest on bonded and floating indebtedness, making the net income for the year $2,652,718. From this sum a deduction for depreciation amounting to $491,211 is made, leaving the net earnings of the operating companies for 1901 $2,161,506. Out of this the operating companies have paid dividends amounting to $1,150,750, which has gone into the treasury of the New Jersey company. During the year the sum of $253,662 was expended for improvements. The balance sheet of the company shows the total assets, including cash loans, stocks, and bonds, to be $27,859,025. The old board of directors was re-elected.

Obituary.

William Stuart McNaughton died at his home in Detroit Wednesday, April 9. He began his business career with the Michigan-Peninsular Car Co., in Detroit, but about four years ago went with Matthew Addy & Co. and represented them throughout Northern Ohio. He was a young man of great promise. He made friends readily, and was liked and respected. He died of hasty consumption which followed an attack of pleurisy brought on by getting thoroughly drenched in a sudden storm last autumn. In the hope of regaining his health he went to New Mexico in December, but two weeks ago returned to his home in Detroit to die.

The South Texas Iron Works, of Houston, Tex., which was recently incorporated with $30,000 capital, is having plans prepared for the erection of a foundry and machine shop. Robert Storm has been appointed superintendent of the plant.

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OPEN-HEARTH STEEL OUTPUT AND SCRAP SUPPLY.

Occasional references to the growing scarcity of steel making scrap, as compared with basic open-hearth furnace capacity, have been made in these columns and those of other trade journals, based simply upon general facts in the possession of the trade. An examination of the statistics, only now possible by the report of open-hearth steel production in 1901 made public in the past few days, shows that the condition confronting the steel maker and prospective steel maker is much more serious than was supposed. One might be led to believe that the steel manufacturer has been in part prepared in the past year or two for the impending dearth of scrap for his use. Such is not the case. In the past five years the percentage of scrap used in basic open-hearth steel making has steadily increased. Even in 1901 there was no diminution in the percentage, but on the other hand an increase, as the statistics will show. The basic pig iron production of the country is used for no other purpose than the making of basic open-hearth steel. The statistics of Bessemer pig iron and Bessemer steel production show that to the end of 1901 no considerable portion of the Bessemer pig production has been used otherwise than in making Bessemer and acid open-hearth steel, and for foundry use. Hence, if we divide for each year the production of basic pig iron by the production of basic open-hearth steel we shall get quite closely the average percentage of pig iron used in the charge. The balance is practically all scrap. The following table presents these computations:

	Production of basic iron, tons.	Production of basic open-hearth steel.	Percentage of pig iron to steel.
1897	556 291	1 056 043	52.7
1898	735 444	1 569 412	50.1
1899	985 033	2 080 476	47 4
1900	1 072 376	2 545 091	42 1
1901	1 448 850	3 618 993	40 0

It will be noticed that in each year from 1897 to 1901 the percentage of pig iron was less than in the preceding year. The percentage of scrap was correspondingly greater. The open-hearth steel makers have not felt the pinch of scarcer scrap except that they have had to pay higher prices. The prices have still been such that, all things considered, it paid better to use it.

Suddenly, therefore, instead of gradually, the basic open-hearth steel manufacturer must be contented with less scrap, and must pay the full price for what he does use. In 1901 the production of basic open-hearth steel increased 42.2 per cent over 1900, or more than 1,000,000 tons. The increase in production this year over 1901, if the plants are able to get raw material of one kind or another, will be between 1,000,000 and 1,500,000 tons more, due to the erection of new plants and the extension of old ones.

The scrap consumed in basic open-hearth steel making in 1897 was about 500,000 tons. In 1901 it was about 2,000,000 tons. In order to use the same propotion of scrap that was used in 1901 it would be necessary, by the close of the present year, that the available steel making scrap should be increased to the rate of 3,000,000 tons a year. Plants recently completed, and which will be completed by the end of 1902 will have a productive capacity of fully 5,000,000 tons of basic open-hearth steel ingots. The remaining 2,000,000 tons of pig iron is over a third larger than our basic pig production in 1901, and yet there is a decided tendency for many of the furnaces which contributed to the 1901 tonnage to go on to foundry and forge iron.

The solution of the problem is drastic. The ordinary basic open-hearth steel maker has made many attempts in the past few months to change to a practically all pig charge, driven to the expedient by the high prices of scrap, but has invariably returned to scrap, even at the high prices. Recourse must be had, for the steel which is absolutely required, to such open-hearth processes as permit the use of an all-pig charge. Only the large producers can use such processes.

But leaving out of the account the matter of available material, it is a question if the country can stand the present pace of new erection. In the five years from 1896 to 1901 our production of all kinds of steel was increased in the proportion of one to more than two and a half. The present rate of new construction would continue the pace, and there are no signs of a decline in new erection in the future. The same rate would increase our production in another five years to six and a quarter times that of 1896. Fifteen years hence it would be 39 times the 1896 production! It may be well for the industry as a whole that natural laws are applying the brake.

LABOR QUESTIONS IN THE METAL-WORKING TRADES.

The convention of the National Metal Trades Association at Cincinnati last week prompts a question as to the status of the movement in the foundry and machinery trades for collective bargaining between organized employers and organized employes. Three associations in these two trades have stood for the same methods of conference and conciliation that have been practically operative for years between iron and steel manufacturers and the Amalgamated Association, or in the bituminous coal industry between mine owners and the organized miners. These three associations represent different measures of success in the carrying out of the plan of conference and mutual recognition. The Stove Founders' National Defense Association and the Iron Molders' Union gave fresh proof only a fortnight

ago of the substantial footing of their relations, by adding another to the long list of agreements they have reached in an unbroken record of friendly conferences. For years they have met and discussed their differences, with never a severance of their relations. The National Founders' Association is less than four years old. It has had some serious encounters with the Iron Molders' Union, and the conferences of the two organizations have developed some radical differences, which were accented by the Cleveland strike. Yet the movement has made headway, and the repeated conferences, though often involving sectional or local issues, have helped to a better understanding. While the New York agreement has not been kept, the abstract proposal that there shall not be a strike or lockout pending the adjustment of disputes still stands, and neither side will take the responsibility of voting to abrogate it. Decidedly hopeful, yet far from realizing the thought of the more sanguine advocates of the conference method, are the relations of the molders' and the founders' organizations. The satisfactory settlement of the wage differences in Cleveland last month was a conspicuous example of the possibilities of even so bad a situation as that in Cleveland has been by general repute for years.

The National Metal Trades Association just now, doubtless because of the abandonment of the New York agreement early in the troubles of 1901, is on no footing of conference with the International Association of Machinists. It is not necessary to rehearse the events leading to this unfortunate state of affairs, but it is plain that the day of any effective cooperation between the two organizations is far off. The machinery manufacturers, bearing out their contention that questions of wages and hours must be treated locally and not nationally, are magnifying the work of the local associations in the handling of labor questions, and their national organization will be rather a molding and directing influence than a strong centralized power directly exerting itself in the adjustment of labor troubles. There are more widely divergent views within its ranks on the question of recognition of labor unions than in either of the other two employers' organizations we have mentioned.

What the outcome will be, is the question of practical interest. Without reference to the Cincinnati convention, the sessions of which were largely confined to the members, and of a confidential character, we believe the future operations of the firms in the association will be far more a matter of the manufacturers' control and initiative than heretofore. The abrogation of the New York agreement last year, by the ordering of a strike and the refusal of the machinists' union to confer on the wage and hour demands locally, was an egregious piece of folly and it will be years before the machinists will again secure the degree of recognition they had as the result of the Murray Hill Hotel conference of 1900.

This does not mean that machinery manufacturers are to have matters their own way or that the campaign for shorter hours is not to go on. It means rather that local conditions will decide the terms of agreements, either between individual concerns and their men or between a local organization of manufacturers and the union in a particular locality. The agitation the International Association of Machinists is carrying on will have its effect even in shops not under the restrictions of the union, and the only guarantee of permanently peaceable relations between employer and employes is that which comes from a good wage on the one hand and a satisfactory output on the other. If the employe is well paid and the employer is attaining new economies in the production of his goods, both are satisfied. A prime factor in the working out of the problem to a satisfactory solution is the premium plan of compensation. It is beyond question the foremost feature in the machine shop situation today. In the past year it has been adopted in many shops, with the result that larger wages have been earned and a larger product has been turned out at a reduced cost per unit. In Cincinnati a majority of the leading establishments are operating on this plan, and proprietors and men are the gainers. And the movement is rapidly spreading. If time shall demonstrate that employers are disposed to administer this plan fairly, and not to allow the evils of the piece work system to come in—not increasing the allotted day's work when the premium creeps up—there is good ground to expect a very considerable disappearance of present frictions. No conference or conciliation committee can approach this plan in practically arriving at a basis of mutual interest.

NATIONAL METAL TRADES ASSOCIATION.

The session of Wednesday, April 9, of the National Metal Trades' Association at Cincinnati was thoroughly in harmony with the cordial experience of the previous day and good progress was made with the work of the convention. The excellent work of the association of Cincinnati manufacturers last year in handling labor matters had evidently made a strong impression upon the members, and the reorganization committee was directed to prepare a plan at its forthcoming meeting on May 5, in New York, for a National federation of local associations represented by delegates. The newly elected president will appoint five additional members to serve on this committee.

A provisional report from the reorganization committee was made late in the day at the Wednesday session, but the matter after considerable discussion was again referred back. After the New York meeting the new plan of organization will be submitted to the members for the necessary two-thirds approval.

A paper was read on Wednesday afternoon by Thomas E. Durban, of the Erie City Iron Works, Erie, Pa., on "The ten-hour day." This brought out a very general and spirited discussion.

The report of the auditing committee was received, certifying to the excellent manner in which the books of the association had been kept.

The following officers were elected by a unanimous vote: President, S. W. Watkins of the Christensen Engineering Co., Milwaukee, Wis.; first vice president, E. F. DuBrul, of the Miller, DuBrul & Peters Mfg. Co., of Cincinnati; second vice president, A. H. Bullard, of the Bullard Machine Tool Co., of Bridgeport, Conn.; treasurer, N. B. Payne, Payne Engine Co., of Elmira, N. Y.; commissioner and secretary, Victor H. Olmsted, of New York.

A cordial vote of thanks was tendered to the members of the Cincinnati district for the reception and entertainment given the association during the convention.

Owing to the election of Mr. Payne as treasurer, H. N. Covell, of the Lidgerwood Mfg. Co., Brooklyn, N. Y., was elected to fill the vacancy in the chairmanship of the second district. The retiring president of the National association, George F. Steedman, of the Curtis & Co. Mfg. Co., St. Louis, Mo., was unanimously elected to membership in the administrative council.

C. U. Carpenter, supervising factory inspector of the National Cash Register Co., of Dayton, O., had intended to deliver an address before the convention on the effect of environment upon laboring conditions, but he was unexpectedly called from the city on important business and could not fulfill the engagement in Cincinnati.

A well attended smoker tendered to the members at the Grand Hotel by the Cincinnati Metal Trades' Association was held Wednesday evening and brought the proceedings of an energetic and profitable gathering to an enjoyable termination.

NEW BLAST FURNACE PROJECTS.

Two Additional Stacks at Edgar Thomson.

It can be stated on reliable authority that plans have been prepared by the Carnegie Steel Co. for the erection of two additional blast furnaces in connection with the Edgar Thomson plant at Braddock, Pa. There are now nine furnaces, and with the two additional stacks, will be one of the greatest blast furnace plants in the world. The present furnace capacity at Edgar Thomson is given at 1,100,000 tons annually, but this will be increased to about 1,400,000 tons by the addition of the two furnaces. The new stacks will have a capacity of about 600 tons daily and will be modern in every respect.

The Detroit Iron & Steel Co.

Some details of the project for a blast furnace at Delray, below Detroit, commonly referred to as the Zug Island furnace, are now available for publication. The Detroit Iron & Steel Co. has been formed under Michigan laws to carry on this enterprise. It will have a capital of $1,500,000, divided equally between preferred and common stock. Those interested include the Solvay Process Co., whose works adjoin the new furnace site, several Detroit capitalists, and M. A. Hanna & Co., of Cleveland, and some of their Pittsburg friends. The management of the enterprise is in the hands of M. A. Hanna & Co. The plan is to build a furnace 77 feet high by 17½ feet bosh diameter, having a capacity of from 250 to 300 tons a day when running on foundry iron and 300 to 350 tons a day when running on Bessemer. Work will begin in the next few weeks. The coke supply will be obtained from the Semet-Solvay by-product ovens near by, operated by the Solvay Process Co. There are 30 ovens at present and 30 additional are being built. Ultimately the number will be increased to 180 ovens.

The Detroit market will take a large part of the output of the new furnace, the consumption in that city alone being about 140,000 tons a year.

A New Blast Furnace for Cleveland.

Rogers, Brown & Co., in connection with S. W. Croxton and associates, of Cleveland, have organized the Cleveland Furnace Co., and will begin at once the construction of a large modern blast furnace on the Cuyahoga river in Cleveland. A large tract of land has been optioned sufficient for a material expansion of the plans of the company in the future. The capital stock of $1,000,000 is fully subscribed by a small group of men who have been for years prominently identified with the iron business. Plans are being drawn for two furnaces of 85x20 feet, with capacity of 400 tons each daily, but construction of but one will be undertaken now. Ore will be unloaded on the Wheeling & Lake Erie dock and taken thence to the furnace yard, about a mile distant, under an advantageous switching arrangement.

The board of directors will consist of Archer Brown and William G. Park, of New York; S. W. Croxton, of Cleveland; D. B. Meacham, of Cincinnati, and J. G. Battelle, of New York. David T. Croxton, manager of the Penn Iron & Coal Co., Canal Dover, O., will have charge of construction and will manage the furnace. D. B. Meacham, of Rogers, Brown & Co., Cincinnati, will be president of the company. The offices will be in the Perry-Payne building, Cleveland.

The above makes at least five new foundry iron furnaces that will soon be under construction in the West and Central West, the others being at South Chicago, Toledo, Zug Island, below Detroit, and Dubois, Pa. The Canton, O., project has been given up.

The Hardware Jobbers' Consolidation.

In the past week more definite announcement has been made concerning the long-pending consolidation of hardware jobbing interests. Some 50 or 60 concerns are reported to be included, but none in New York City. Some concerns reported to be in the plan have denied that they are to have part in the consolidation. Shelf and heavy hardware and metals are represented by the firms reported to be in the list, these including eight firms in Boston, five in Cleveland, one each in Philadelphia, Pittsburg and Buffalo, two in Detroit, six in Pacific Coast States, 14 in the South, and the others scattered over the East, Central West and Northwest. E. C. Simmons, of St. Louis, is talked of for president, John Bindley, of Pittsburg, for vice president, and W. D. Simmons, of St. Louis, for chairman of the executive committee. The proposed capital is $120,000,000, of which $40,000,000 is to be 6 per cent cumulative preferred. A board of directors of 25 to 30 persons is proposed. Many jobbers who are not in the consolidation believe that the benefits to be derived from combining are not sufficient to warrant giving up their identity. Opinion in the trade is divided, but there is no great enthusiasm over the consolidation; nor on the part of those outside is there any fear that they will be adversely affected. The economies of a jobbing consolidation are not comparable to those possible to combining manufacturers.

Again a "Rival for the Steel Trust."

The story of a $200,000,000 iron and steel consolidation in opposition to the United States Steel Corporation has been made to do duty again the past week. The same New York attorney, reputed to be a member of the firm of Blymer, Hobbs & Clarke, New York City, who was heard from as the promoter of this ponderous affair the last time it occupied a column of space in New York papers, has been giving out particulars again. A number of Valley furnaces, and a miscellaneous list of mills and bridge works are strung together to make an imposing array. The list of capitalists the article gives includes "H. C. Frick, of the Youngstown Iron Sheet & Tube Co."; E. J. Bird, of Ironton, O.; E. N. Ohl, of New Castle, Pa., and E. Gifford Ladd. Denials have come from a number of the individuals and firms whose names have been used, and the whole project may be dismissed as having no actual existence or promise of existence.

A New Book by Mr. Carnegie.

"The Empire of Business," a new book by Andrew Carnegie, is to come from the press of Doubleday, Page & Co. this month. Much of the matter is new; other portions are reprints of addresses and pamphlets heretofore published. Something of the character of the volume, which is in Mr. Carnegie's well known style, plentifully strewn with epigrams, may be judged from the following chapter titles: "The Road to Business Success," "The A B C of Money," "The Common Interest of Labor and Capital," "Thrift as a Duty," "How to Win a Fortune," "Wealth and Its Uses," "The Bugaboo of Trusts," "Anglo-American Trade Relations," "Business," "Steel Manufacture in the United States," "The Cost of Living in Brittain," "Oil and Gas Wells," "The Three-Legged Stool," "Railroads, Past and Present," "Iron and Steel at Home and Abroad," "The Manchester School of Today," "What I Would Do with the Tariff if I Were Czar."

Wm. B. Dickson, of New York, who has been in charge of all the purchases of pig iron and other material for the United States Steel Corporation, has been made its second vice president.

E. E. Erikson, Pittsburg, has just closed contracts to erect two acid open-hearth furnaces of 15 tons capacity for the Chrome Steel Co., New York. The company has been making five-ply welded chrome steel and iron plates and similar products for many years in Brooklyn, but as there is not sufficient room there the new steel works will be built at Carteret, N. J. The contracts also call for three plate heating regenerative furnaces, with gas producers. Mr. Erikson has also closed contracts to build two regenerative heating furnaces for the Burden Iron Co., Troy, N. Y., and two continuous billet heating furnaces for Henry Disston & Sons, New York.

Work has been progressing well, considering the weather, at the plant of the Norwalk (O.) Steel & Iron Co., for which E. E. Erikson, Pittsburg, has the entire contract. In starting the foundations it was necessary to blast off two feet of frozen ground with dynamite, the pieces of ground being dragged away with chains. The piers for the boiler and gas producer houses are completed, and all the contracts for machinery, except the shears, have been let.

SHOP MANAGEMENT AND TASK WORK.

At the regular meeting of the Franklin Institute, Philadelphia, held on Thursday, April 10, Fred W. Taylor read a paper on "Shop Management." The paper dealt at length with the systems instituted by Mr. Taylor in the works of the Midvale Steel Co. and the Bethlehem Steel Co. These are composed of three elements as follows: An elementary rate-fixing department, a differential rate system of piece work, and methods of managing men who work by the day. Of the paper as read we make the following synopsis: Good shop management is a very important element in an engineering or manufacturing business, though at times we are tempted to say it is not, since we have all seen engineering and manufacturing concerns established under poor management that are not only successful but successful through a term of years. In a period of 10 years spent in intimate association with the management of engineering concerns engaged in different lines of work, one fact strikes me very forcibly, and that is that an owner or manager succeeds in organizing a business in his own particular way, while the different departments of it are left to themselves. Organization has not yet reached the dignity of a science or an art. It is attended to in the main during the spare moments of the manager.

There are many types of management—many types even of good management. An important point in any management is to obtain a thorough co-operation between employer and employe. The co-operation to which I refer is that in which employers and employes work harmoniously to gain the same end. To accomplish this the workman should receive more than the average paid to men of his own class. The man must have the same desire to get even higher wages. These objects, I am sure you will agree with me, are good ones. You may perhaps consider them impracticable, and there may be reasons why they cannot be realized. But it is not a Utopian scheme, and may be carried out in many establishments. Good management appears to rest on fundamental principles, yet I have never started a system in any plant without finding these principles violated over and over again.

Every man in a shop should have his daily task laid out for him. It should be carefully and completely described and circumscribed. Each task should be set so that it may be accomplished to a certainty. The workman should be certain of a good day's pay in case he accomplished his task. He should know things would be unpleasant for him if he failed. The task should be made so difficult that only a first-class man could possibly keep up with the work. The main object I have spoken of is high wages with cheap production. It may be secured under either day or piece work. Whether day or piece work it is simply necessary that the fundamental principles mentioned be adhered to.

Take a large machine shop, and let us begin with the foreman, applying our first principle to him. Are his duties clearly circumscribed, and is it possible for him to do his daily task? He must lay out the work for the day, know the proper man to do certain work and how he should do it, and all the while he must look ahead a month or so. He must look after the men and readjust their wages. In a large shop it is not really possible for him to do all this. What is the remedy? To subdivide the foreman's duties? Yes. But how? An easy way, perhaps, is to divide them into parts—one for lathes, another for planers, and so on. This means a lot of sub-foremen and the fact is that men having all the varied information combined with the other qualities for gang bosses, are hard to get. What will a gang boss have to do? He must see that the work goes into each machine in the proper way; see that the right jigs and appliances are on hand and that each workman sets his work right. After the work is in the machine he must see that the right tools are at hand; see that the men keep the machines clean and in good order; see that all the machine operations are fast; discipline the men under him and adjust their wages and the time keeping. All these qualities go to make up a perfect man, and a man combining them all is hard to get. Give each boss a clear task for each day and hold him strictly accountable for results. The question may be raised whether all this does not cost more than can be maintained, and yet all the work done by the gang bosses must be done by some one. Unless these bosses are busy, and busy all the time, it perhaps does not pay to have them. They should be men able and ready to pitch in, to help their men with their hands, show them what to do and how to do it.

Discussion.

Wilfred Lewis:—I have been much interested in the paper of Mr. Taylor. I judge from it that there is a great deal of engineering to be put into shop management. The plan mapped out should be appreciated and adopted. The difficulty, it seems to me, is to arrive at what constitutes a fair day's pay for a fair day's work, and what is a fair day's work. What a workman should receive for extra endeavor is also a question. I have been trying to adopt the plans of Mr. Taylor in our own shop, but I have not yet succeeded in getting them installed.

A. Faikenau:—The thought that has struck me in regard to Mr. Taylor's system is that the application of it to a great extent has been to steel works. How far the method can be carried out where the work is of a miscellaneous character, such as in a ship building plant, or in engine building works, I cannot learn. I have had some experience with the premium and piece work plans and whenever we had work which you might call "repetition" work it was all right, but on miscellaneous work the greatest difficulty comes in the estimating end, the matter of obtaining data being very important.

Mr. Taylor:—In the Bethlehem works the work is mostly of a miscellaneous character and covers the product of the forges, the iron foundry and considerable of the product of the steel foundry, machines, guns and gun carriages. Not once in 20 times do some of the jobs come to the same machines; sometimes not within a period of three or four years.

Silas Chambers:—After considerable trouble in the effort to adopt the piece work and premium plans in our shops, it is now established and work was never turned out at such low cost as at present. We pay higher wages and our workmen earn more money than ever.

AMERICAN METHODS AT WORK ON THE OTHER SIDE.

The London correspondent of the Chicago *Evening News* recently treated his readers to a somewhat amusing account of the manner in which the British Westinghouse Co., the large semi-American corporation which is now erecting workshops at Manchester, had overcome opposition to American methods on the part of British builders and workmen. According to the correspondent the company called together a number of British master-builders, showed them the plans and asked them in how short a time they could carry out the work. The reply was "five years." Then, the correspondent says:

"The Westinghouse Co. coughed very loud and said, 'Ah,' and were very sorrowful for a time, until they sent to America and got J. C. Stewart, of St. Louis, to go over as building manager. Mr. Stewart brought ten Americans with him, and he got together 2,000 men of Britain, and he asked them how many bricks each one of them could lay a day, and each man answered promptly: 'Four hundred and fifty, sir.' Mr. Stewart passed his hands over his eyes and mouth that the men of Britain might not see him smile, and he told them to get to work; and he put bees in the bonnets of the various foremen in the shape of presents of 10-guinea suits of clothes, to induce the workmen to work, and in two weeks the British workmen were each laying 900 bricks a day. But this would never do; so they were induced to work faster, and were given 11d. instead of 10d. an hour, and a few weeks ago they were laying 1,800 bricks per day of nine hours, and this first year sees the completion of the buildings which it was said it would take five years to build."

We have made some inquiries in Manchester as to the truth of the Chicago gentleman's allegations. Allowing for the naturally exuberant imagination of an American writer, which accounts for such flowers of speech as "ten-guinea suits of clothes," and allowing for the fact that those from whom we had to make inquiries were mostly Americans connected with the British Westinghouse Co., and therefore presumably not entirely unbiased, it must be admitted that there is substantial justification for the American journalist's amusement. It seems to be a fact that the Westinghouse Co. could not find master-builders in this country who were at all able

to grasp, much less to comply with American ideas as to the time required for the erection of works. The British builders suggested from four to five years. The time-limit of the Americans was twelve months. In the end the company decided to do their own building, and they appointed Mr. J. C. Stewart, of Pittsburg, their building manager. The work was begun in April, 1901, and it is now so far advanced that the completion and equipment of the shops in April of this year is practically assured. This feat is believed to constitute a building record so far as this country is concerned. As to the plant and material used we are officially assured that 80 per cent of it has been imported from the States at prices averaging 40 per cent below those quoted by British suppliers for similar plant and materials.

The British Westinghouse Co., although not objecting to employ union workmen, has from the first successfully resisted all attempts on the part of the trade unions to control its building operations. The managers of the company say that they know what can be done in the way of labor, and that they have made it a rule to be satisfied with nothing less than the maximum output. In the first place, they secured a thoroughly efficient staff of well-paid foremen, and started a system of daily reports of progress. Secondly, they offered more than the average amount of pay for good honest work. At times trouble was threatened on the part of the trade unions, especially in connection with the bricklaying and joiners' work. At first the maximum output of the bricklayers (who were paid 11d. per hour instead of the union's district rate of 10d.) was 900 bricks per man daily; but by a continuous process of elimination of the least-fitted, the output was increased to an average of between 1,800 and 2,000 bricks per man daily. Much of the same process went on with the carpenters and joiners, who were also paid 1d. per hour above the current rates. We are informed that, notwithstanding the high rate of wages paid, the total cost of the building has been remarkably low, while good work has been secured all round.

We commend this tale of bricks to the Works Committee of the London County Council, which has practically had to admit the truth of most of the accusations of loafing brought against the men employed by it, and which does not seem to get out of its men more than one-third of the work which the Westinghouse Co. has succeeded in extracting out of the British bricklayers employed at Manchester.

When the Westinghouse works are finished they will give employment to about 7,000 men, and it is asserted that their managers intend to provide the engineering trades of this country with an object-lesson similar to that which they have given to the building trades. It is stated that the company has no intention of submitting to trade union control where it interferes in any way with their system of working. It is just now a matter of speculation among British engineers whether the company will be able to secure sufficient British labor upon conditions differing from those normally prevailing in British engineering workshops. The unexpectedly hostile attitude taken by the trade unionists in the engineering industry towards the revised draft of the terms of settlement for the regulation of labor conditions in workshops, which were agreed upon after the strike of four years ago, is ominous of a possible revolt against the introduction into this country of American methods which are out of harmony with British trade union traditions. It is not unlikely that in the end such undertakings as those of the Westinghouse Co. may prove most powerful allies of British engineering employers in their struggle against artificial restrictions of output on the part of the trade unions.

Joseph D. Gallagher, formerly president of the Lappin Brake Shoe Co., has been appointed second vice president, and Joseph B. Terbell, formerly president of the Corning Brake Shoe Co., general sales manager of the American Brake Shoe & Foundry Co.

The Kokomo Steel & Wire Co., Kokomo, Ind., announces that it will be ready shortly to offer to the trade some new designs of farm fence, one of which in particular, it is believed, will meet with general favor. The company manufactures also barb wire and wire nails. Its new wire department will be ready for operation by May 1.

CINCINNATI MACHINERY MARKET.

CINCINNATI, April 14.—The Cincinnati machinery manufacturers give the universal report that business is in a very satisfactory condition. While they are not having quite so much of a rush now as during the past year they feel that it is better to have a uniformly even business that occupies their entire force full hours than to have a spasmodic rush that compels running extra hours, with the necessity oftentimes of running a full night shift.

The domestic demand continues very good and during the past week or two inquiries that have been received from abroad indicate that there is a better condition in Continental Europe than for some time past. It is particularly noticeable that the English-speaking colonies and the far Eastern countries where the influence of European governments has been felt, are active in seeking American machinery and operating it on American methods. Shipments have been made by Cincinnati concerns to South Africa, Australia and Japan, rather than to Continental Europe itself. Still the indications are that in older European countries there is an improvement as stated above. Extensions and additions are still being made by Cincinnati manufacturing concerns and there is nothing in present indications to make one feel that there will not be a continuance of present satisfactory conditions.

Oscar Mueller, who recently withdrew from the firm of Dreses, Mueller & Co., has purchased an interest in the M. & M. Machine Tool Co. and will carry on that business in the same location on Pearl street.

The American Laundry Machine Co. found it out of the question to close the deal for the property it first had in mind and has now secured a five-acre tract on the B. & O. S. W. railroad at Norwood. The property is sold to the company by a syndicate that has a large tract adjoining the factory of the Globe-Wernicke Co. The Laundry Machine Co. will begin the erection thereon of buildings according to the plans that have been drawn for some time. The company is sadly in need of a new factory and the delay which it has met with has been rather serious. Orders have been taken during the past few weeks for shipments of complete laundry outfits to Russia, South Africa, Australia and Great Britain.

The Bullock Electric Mfg. Co. has decided to erect another building between the present administration building and the large machine shop that is now under course of construction. The latest addition to the big plant at Norwood is to be called a service building and it is to accommodate the pattern shop, general store room, and large dining room for the employes of the works. Work is progressing very satisfactorily on the large machine shop that is now being erected and contracts were let this week for the service building to L. P. Hazen & Co.

The J. H. McGowan Co. is doing a large business in the manufacture of pumping machinery for the use of municipal waterworks. The company since its recent increase in the plant is now better equipped to handle this class of business and is practically devoting a great part of its efforts towards securing contracts for pumping station in waterworks to medium or large size capacity.

The Triumph Electric Co. is filled up with orders for electrical machinery from all parts of the country and some from abroad. During the past week Pedro del Ospino, representing the large transportation company of United States of Columbia, was in Cincinnati and made arrangements with the Triumph for furnishing a large number of motors to be used in connection with electric lighting facilities on steamboats that are to be built in America for use on the Magdalena river.

The S. Obermayer Co. made a shipment the past week of foundry supplies and foundry facings to be used in the new plant of the British Westinghouse Electric & Mfg. Co., located at Manchester, Eng. The Cincinnati concern reports a good business and a large demand for all kinds of foundry supplies, with no indications that the demand will decrease, at least in the immediate future.

The Wm. Powell Brass Co. reports a very good demand from all parts of this country and from many foreign countries for its brass valves and specialties. The concern has made shipments abroad recently in large amounts and there are indications that a considerable amount of business will be placed here in the next few months on account of extensive operations in Russia and Asia. This company is now putting in a switch that will afford it much better shipping facilities.

COMBINATION PLATE AND STRUCTURAL MILL.

BY WM. GARRETT.

One of the strongest reasons given by foreign iron and steel manufacturers for the large production of our American rolling mills is that there is a greater demand in this country for steel bars, etc.; therefore the mills can run on the same size longer than they can without changing sizes or rolls. This is true to a great extent, and one has only to see what is being done in such mills as Jones & Laughlins' and that at the Duquesne works, which are especially designed to make a certain range of bar sizes. There it is a common thing to give an order for from 500 to 1,000 tons of a certain size to be filled without change; and while such mills are suitable for such purposes they are not at all suitable for the general trade where sizes in small lots are required.

In this article I only wish to touch upon one point, and that is the type of mill which would be best suited for the requirements of bridge and car builders. Many concerns of this kind in this country use from 30,000 to 60,000 tons of material per year, but the variety of sizes and range from the maximum to the minimum for their requirements is so great that it is a difficult matter to design a mill suitable for their purpose. By far the majority of the large rolling mills in Great Britain and the continent of Europe are two-high and of the reversing type, this including some of their best plate mills. This idea has been followed out not because they are ignorant of what is being done in this country, where the prevailing type is three-high, but because they believe a reversing, two-high mill to be most suitable for their purpose, as they could change rolls in less time than on a three-high mill, and could also construct and operate cheaper.

annum, and require the material for their own use. This arrangement of rolling mill can make all sizes except those under 1½ inch round or square which may be required, but which constitute a small percentage of the tonnage required for either bridge, car or shipbuilding. It will be observed by examining the illustration, that there is a plate mill attached to this plan. On this mill plates can be rolled up to any width and thickness called for, thereby giving all the sizes of bars and plates required from one plant, only requiring one engine and heating furnace for both merchant and plate mill, and the same crew can operate both mills.

It might be said, What about your raw material? Where are you to get your blooms and slabs? Having this train and the addition of an open-hearth steel plant with or without a blooming mill is all that is necessary. All this can be accomplished for an amount less than $1,000,000. And when the bridge builders and others using large quantities of structural steel come to think that they can with this amount of capital erect a plant suitable to fill their requirements, and taking into consideration the many millions of dollars that have been expended on the large steel works which now furnish them

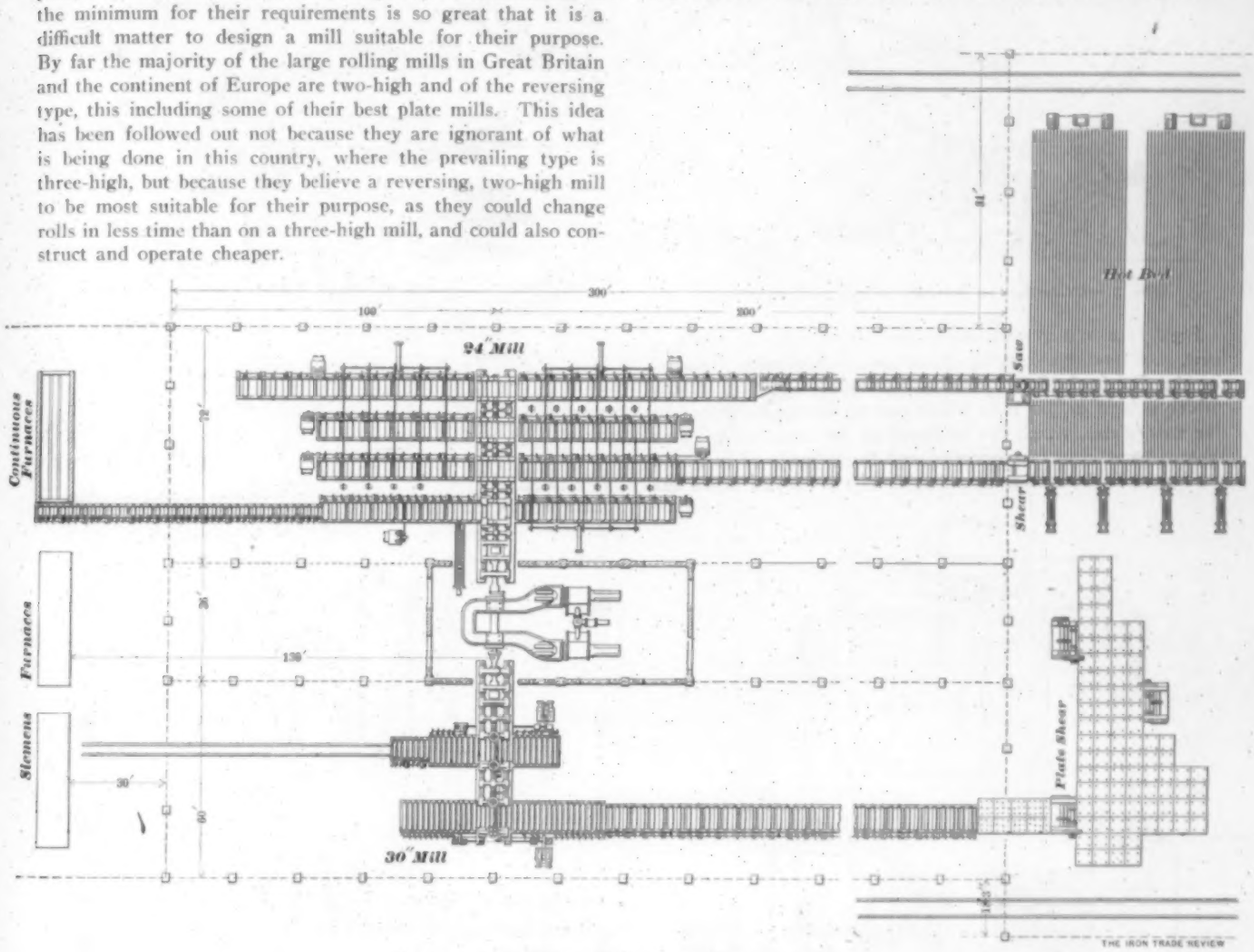


FIG. 1.—COMBINATION PLATE AND STRUCTURAL MILL.

While it is true that on some of our three-high rail mills—for making nothing but rails, beams and channels, and some angles—less labor is required, the demand upon foreign makers is not such as to warrant them putting up special three-high mills for special purposes. They selected the two-high reversing mill; and I may say here their requirements are on a par with the present requirements of our bridge, ship and car builders, viz., a great variety and a limited tonnage. That such is the case can be proven by the many inquiries there are for a mill to meet this peculiar requirement.

To fill this want is suggested a mill as shown in Fig. 1, which is a general plan of a 24-inch two-high reversing bar mill and two-high 30-inch reversing plate mill, both driven by one engine and arranged so that they can both be fed by the same heating furnaces, if desired. This mill is meant to meet the needs of those who require from 40,000 to 60,000 tons per

this material—also the enormous extent to which some have watered their stock—it is evident this article will be for them at least food for thought.

The Aultman Co., of Canton, O., is now employing 500 persons, the largest number in 10 years. The ice machine department, which recently occupied a new building, is being operated 24 hours a day. The elevating and conveying machinery department is also well employed.

The new fifth mill of the Stark Rolling Mill Co., Canton, O., started this week and the plant now employs 300 men.

The plant of the Shickle, Harrison & Howard Iron Co., at St. Louis, Mo., was shut down last week for an indefinite period for repairs.

TYPE OF MIXERS AT GERMAN STEEL WORKS.

Considerable advance has been made in the use of mixers in steel works practice in Germany during the past three years and a new type of mixer which is being installed in German steel works is fully illustrated in a recent number of *Stahl und Eisen*. It is known as the roller type, differing in shape from the old style of mixer in use in this country and abroad, and in addition it is operated differently. The body of the mixer is almost oblong but differs in some respects from the latest mixers installed by the American Steel & Wire Co. and other companies of the United States Steel Corporation. The methods of operation, however, are similar in many respects.

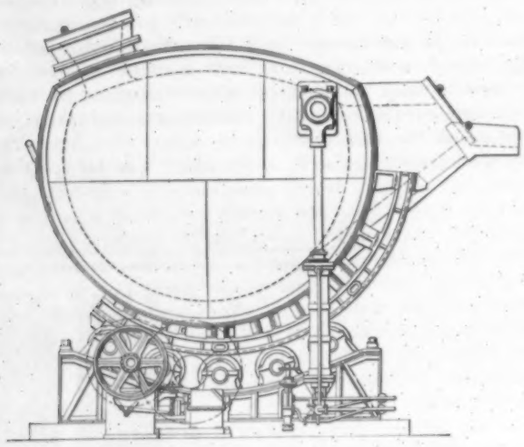


FIG. 1.—CYLINDRICAL ROLLER MIXER.—ELEVATION.

Figs. 1, 2 and 3 illustrate a type of mixers, of which a pair, each having a capacity of 200 tons, was recently installed in the Rombach Steel Works, Rombach, Germany. Each mixer is built on ten rolls which rest on bearings attached to the base plates, which are anchored to the foundation. Two cogged bands and two smooth-faced bands made of cast iron are bolted to the mixer, extending from a point just below the spout for a distance of about one-third of the body of the tank. Owing to the cylindrical shape of the vessels, no strengthening bands are required, their shape giving them sufficient strength and solidity to withstand the pressure of the molten metal when nearly full.

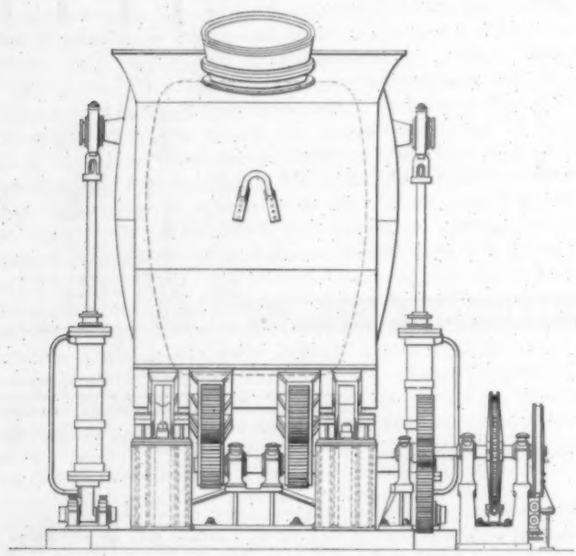


FIG. 3.—ELEVATION FROM CHARGING SIDE.

The spout of the mixer has been placed in such a position that the metal bath can be constantly overseen by the operator and the drawing off of the slag is made comparatively easy. In order to keep the mixer constantly on an even balance when pouring the molten metal the cast iron bands bolted to the outside of the tank are adjusted eccentrically to it instead of concentrically. The tilting of the mixer is accomplished by an electric motor by means of a worm and cogwheel, but there is also a hydraulic oscillating cylinder arrangement by which the tilting of the mixer can be brought about, though this is kept in reserve. As a further precaution there is a hook arrangement fastened to the back of the mixer whereby the tilting can be done by an electric crane in case the two methods above should fail. This type of mixer is constructed according to the plans of W. Oswald, of Coblenz, Germany.

The peculiarities distinguishing this mixer from those in use in the United States are given as follows: First—The mixers rest on eccentric bearings to compensate the overweight of the cast iron spout through which the iron is poured. Second—The vessel is of such a shape that further strengthening by means of bands, etc., is unnecessary. Third—The cylindrical shape of the vessel requires less brick for lining purposes than mixers of different shapes. Fourth—The mixer can be operated either by means of electricity or hydraulic power. These mixers are not only lined to the height which the molten metal reaches but throughout with magnesite brick. This somewhat expensive lining has proved the wisdom of the increased first cost inasmuch as it has withstood a campaign of a year without being repaired in any way.

The article from which the above description is taken cites examples of the profit to steel plants in introducing mixers.

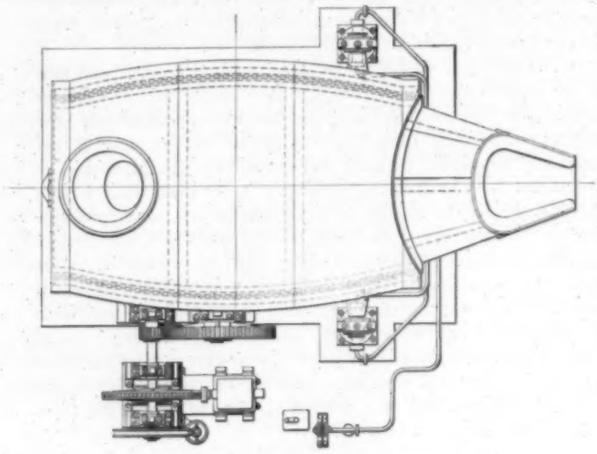


FIG. 2.—PLAN VIEW.

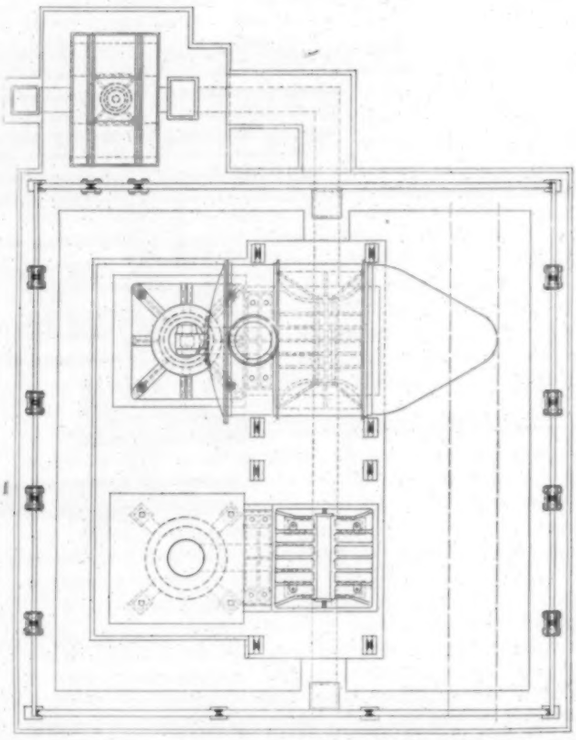


FIG. 5.—GENERAL PLAN OF MIXER PLANT AT DIFFERDINGEN, GERMANY.

It states that the time of blowing a charge in the converter has been reduced from 15 minutes to 11 minutes and the furnaces producing the iron are given more latitude with regard to the charge and the resulting product inasmuch as the mass from different tappings at the furnace is made uniform in the mixer.

According to data furnished by the Hoesch Iron and Steel Works the loss of iron in blowing in the converter has been reduced from 14.72 per cent to 12.86 per cent by use of the mixer, a saving of 1.86 per cent. At times the loss of iron in blowing has been reduced to 12 per cent and efforts are being made to reduce this loss still further.

In Figs. 4 and 5 are shown a tilting mixer with a capacity of 250 tons, two of which are installed at Differdingen. The

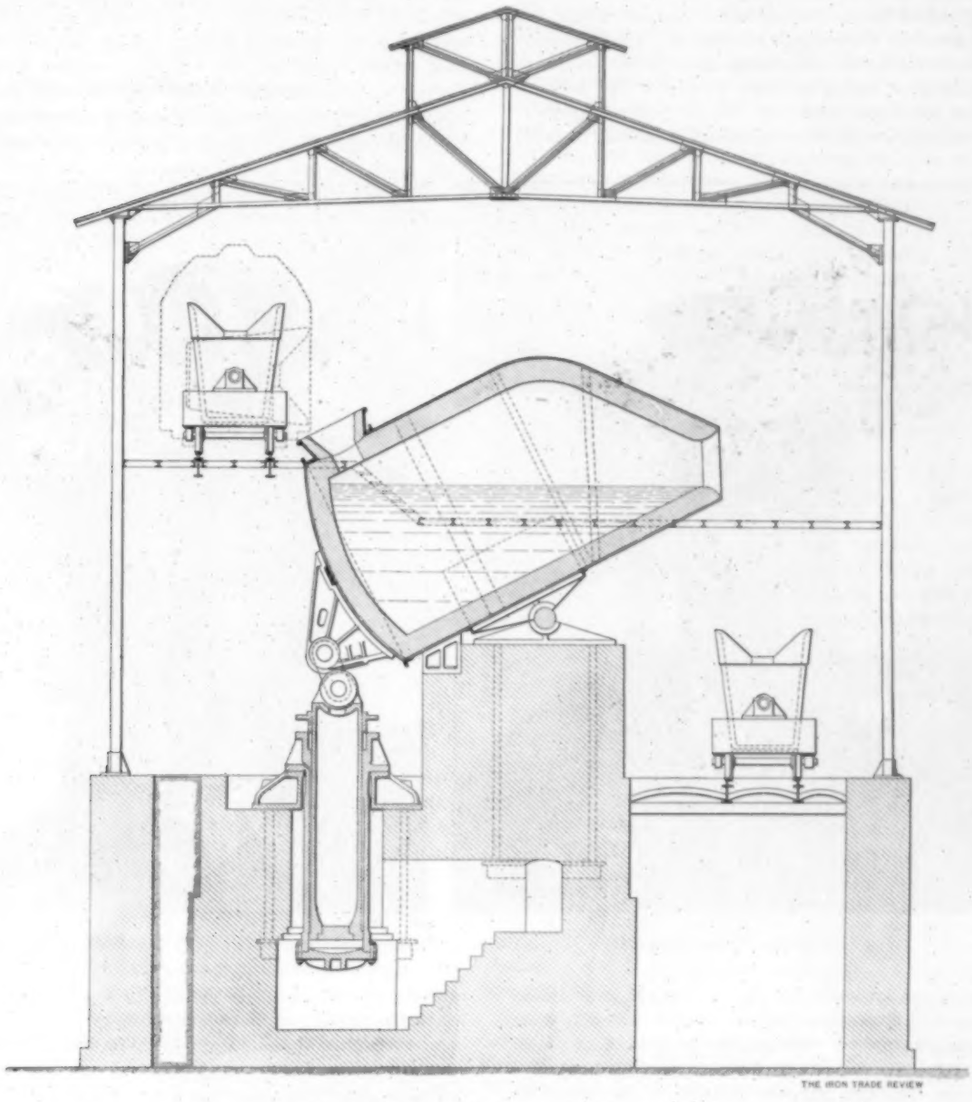


FIG. 4.—SECTIONAL VIEW OF TILTING MIXER.

mixer is 4,600 mm. in diameter and 8,300 mm. in height. It is lined almost throughout with magnesite brick. On account of its great weight the mixer does not rest on the trunnions or steel supports formerly almost universally used, but on a saddle-like base which encloses a roller. The point of support of the mixer is selected in such a way that the empty vessel balances itself. In the deepest backward position the mixer rests on a chair support which is built into the foundation. A complete emptying of the mixer is thus made possible when this is desired for relining or repairs. The mixer is operated by hydraulic power and the plungers of the tilting cylinders are connected to the mixer in such a way that the automatic tilting of the empty mixer is avoided.

The molten iron is transported to the mixer in ladle cars operated either by steam or electricity and can be elevated to the mixer platform by hydraulic power. The levers regulating the tilting cylinders are arranged in such a manner that the operator in charge can oversee entirely the filling or emptying of the vessel. Proper precautions are also taken in case of the breaking of the hydraulic machinery to prevent the tilting of the mixer and the spilling of the molten mass.

A United States patent has been allowed to Georges Charpy, Montlucon, France, for an improved method of manufacturing armor plate. The inventor has made an assignment of patent rights to Cie. des Forges de Chantillon, Commentry et Neuves-Maisons, at Paris. The new process consists in the manufacture of an armor plate of steel, containing about five per cent of nickel and from 0.1 to 0.15 per cent of carbon, and about 0.5 per cent of chromium, cemented on one face only, and hardened at a temperature of about 750 to 800 degrees centigrade without subsequent annealing, thereby producing a cemented face with a porcelain-like texture and hardness and the remainder of the mass has a non-laminated formation. Two of the claims omit the percentage of chromium from the list of constituent parts of the article of manufacture.

The members of the National Stove Manufacturers' Association, whose representatives recently agreed in conference with the officers of the Iron Molders' Union, to advance wages five per cent, have announced a five per cent advance in the price of stoves. This is due principally to the market advances in pig iron and scrap.

The Marinette Iron Works, Marinette, Wis., has received an order for gas engines from Lisbon, Portugal.

THE WALKER UNIVERSAL SURFACE GRINDER.

O. S. Walker & Co., of Worcester, Mass., has a line of fine grinding machinery that affords an interesting solution to some of the problems incident to accurate work. The grinder is capable of finishing metal surfaces with a degree of exactness beyond the reach of other machine shop tools, and the delicacy of its operation is a never failing source of interest among mechanics. This very delicacy, however, requires experienced treatment or the desired end will not be attained. The heat of the sun's rays has been known to effect a very apparent influence upon grinding operations. The careless bolting down of a piece of work on the platen of a grinder is therefore even more liable to result ill than a similar negligence with a planer or shaper. The work may be perfectly finished so long as the holding down bolts and straps remain in position, but as soon as they are released the casting springs to another shape and the ground surface is correspondingly untrue. This condition of affairs has brought out many suggestions with a view to having a yielding or spring pressure to retain the work in position with a minimum distortion. In the ordinary method, care is usually exercised by the thoughtful workman to bring the retaining strap immediately over a part of the casting which is supported by some projection resting directly on the platen and the downward pressure of the bolt is not then applied in a manner that is likely to distort or warp the metal during grinding. It often happens that the straps cannot be applied directly above such supporting points and the difficulty of producing good work becomes greater.

The pressure of the casting upon the platen may be produced in another manner than by the application of bolts binding the two parts together, and this option has developed the use of electricity for this purpose, the electric current being utilized for the energizing of suitable magnetic chucks, and the attraction between the metal points in contact is not only ample for the purpose but the arrangement dispenses with the straps, bolts or similar contrivances that are more or less troublesome to the workman.

A general view of the machine as engaged in the grinding of curved surfaces as illustrated in Fig. 1. The machine is mounted upon a massive bed, which gives support to the carriage at all points of its movement. This bed has a T-shaped cross section, giving it a three-point floor contact. The cross feed slide is 22 inches long, running on dove-tailed bearings, and is cast solid with the carriage. The latter has self oiling V-tracks 34 inches long and the platen never uncovers the ways. Oil catchers are provided at the ends of the tracks. The platen is in two parts, a lower or sliding part and an upper or swiveling part with a screw adjustment for tapers. The swiveling part of the platen is made in two styles, the dry top with scale at the end graduated in inches per foot for tapers, and the wet top for use with the water attachments.

The machine can be furnished entirely free from electrical devices or it can be entirely motor driven with an automatic platen—a platen with a magnetic chuck integral therewith in which the power goes off or on as the machine is stopped or started.

One of the special features of the machine is the automatic dead stop, by means of which the machine takes care of itself after it is once adjusted and started, thus permitting the operator to perform other duties without the care of the grinder to divert attention. The grinding spindle has straight bearings and is mounted in bronze boxes (having positive and rigid adjustments) at the top of a vertical post of large diameter. The spindle is driven by a patented system. The belt enters the post at the center, passing around an idler pulley below, thence back over the spindle pulley and down to another idler pulley swiveling on the end of the vertical feed screw for the post. Thence the belt turns upward and leaves the machine through a separate opening. The lower idler being held from vertical movement enables the spindle post to move and carry the spindle to any vertical position without affecting the belt tension. The spindle post may be swiveled either to right or left, 90 degrees each way, the belt simply running quarter turn.

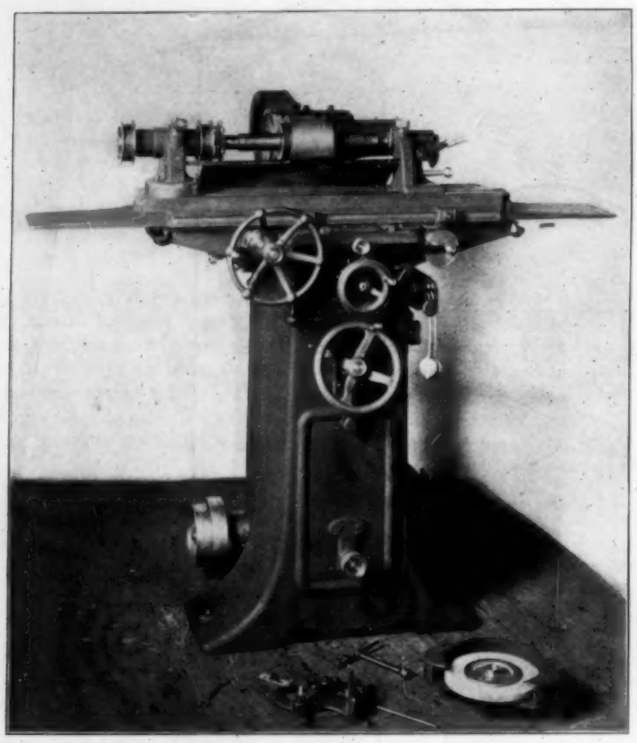


FIG. 1 —A UNIVERSAL SURFACE GRINDER.

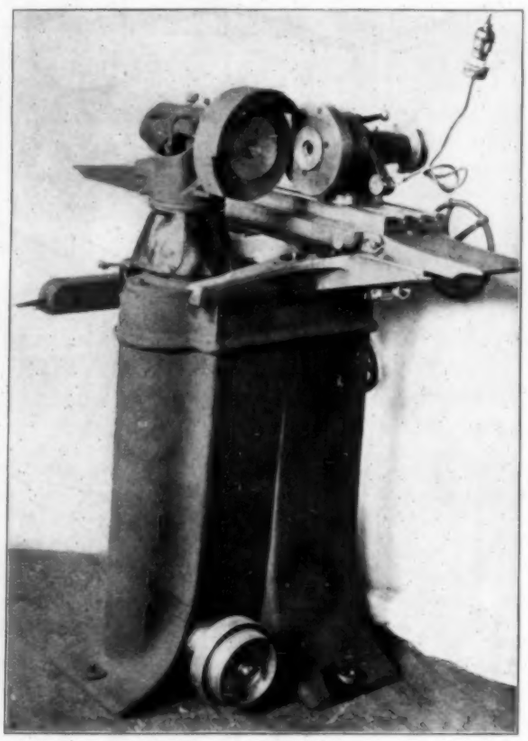


FIG. 2.—GRINDING SIDE OF THIN DISC HELD BY MAGNETIC CHUCK.

The overhead drum has a speed variation of 1 to 4 by simply pulling a cord. There are two speeds to the main counter and either is brought into use by pulling one of the handles attached to the cords seen at the right of the machine in Fig. 1. Pushing or pulling an adjacent knob instantly stops the whole machine. The turning of the knob at the bottom of the door changes the speed of the platen to fast or slow.

Fig. 2 illustrates the machine equipped with the 7-inch rotary magnetic chuck for discs, rings and washers. This method of attachment is much cleaner than the cement process familiar to many workers in sheet metal and is decidedly more convenient. A universal swivel magnetic chuck for flats, bevels or wedge shaped pieces is shown in Fig. 3. This chuck may readily be tilted for grinding knives and similar work. The end blockings can be removed and the chuck held flat on the

platen. Fig. 4 illustrates the plain magnetic chuck for grinding flat surfaces in position on the same type of grinder.

The motor driven grinder of the same make is another development of the machine here illustrated. This machine has a magnetic chuck built in the platen and so arranged that it is automatically magnetized or de-magnetized, as the machine is started or stopped with no switches to turn and no screws to tighten. The operator has only to lay the work on the platen and start the machine. The grinding spindle has a motor coupled directly to the rear end, is ring oiled, and the whole has micrometer vertical adjustment and quick adjustment as well. The carriage and platen are operated by a motor in the base of the machine and all the feeds are automatic at each end of the stroke. There are no bevel gears or clutches in the reversing mechanism and the machine has automatic dead stop, operated by means of an electric contact when the cut is finished.

The Rebuilt Minerva Furnace.

The Minerva Furnace of the Thomas Furnace Co., at South Milwaukee, was put in operation on March 27 after complete rebuilding. There was remarkably smooth working from the start and up to April 10 the product showed 98 per cent of No. 1 foundry iron. The improvements at the plant have been very complete. Improvements to the dock and the installation of three Brown unloading machines will permit of direct unloading of ore at much less cost than before. The old blowing engines have been replaced by new engines of greater power and new boilers have been installed. The furnace has been newly jacketed, the stack having been torn down to the mantel. It is now 75 feet high and 16 feet at the bosh. New pumps were installed by the Fred M. Prescott Steam Pump Co., of Milwaukee, and new fire brick stoves by G. W. McClure, Son & Co., of Pittsburg. The capacity of the furnace is now 200 tons a day. A fully equipped chemical laboratory is maintained. John M. Thomas is president of the company, W. Aubrey Thomas, vice president, and T. E. Thomas, secretary. The sales department is represented by J. F. Forsyth.

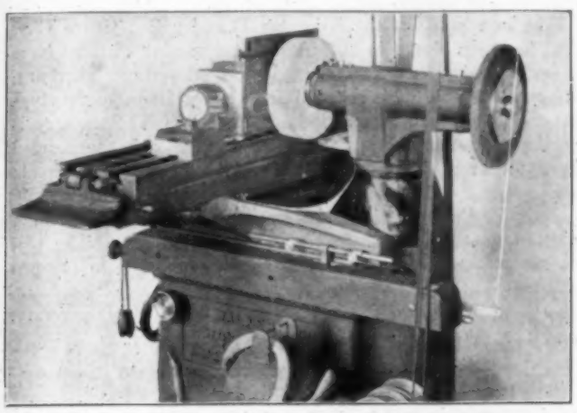


FIG. 3.—GRINDING FLAT SURFACES ON MAGNETIC SWIVEL CHUCK.

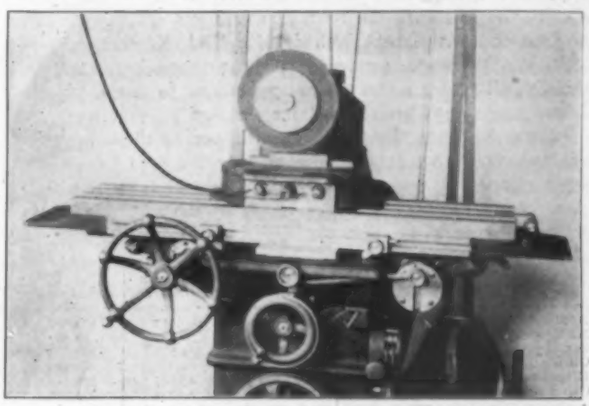


FIG. 4.—GRINDING FLAT SURFACES ON MAGNETIC PLAIN CHUCK.

The United States Drawn Steel Co. and the Niagara Pedal Co., of Buffalo, have consolidated with the Port Huron Steel & Screw Co., of Port Huron, Mich., just organized. The last named company has recently built a plant and will be ready to begin operations in May. It is putting in an entirely new equipment. The company will make cap screws, set screws and steel shafting. The Buffalo companies are now removing to Port Huron. The officers of the new organization are as follows: E. D. Van Ness, chairman; Willard Parker, secretary and general manager; T. A. Goulden, treasurer; Mortimer H. Wright, superintendent. Mr. Parker was formerly president of the Niagara Pedal Co., and Mr. Wright was superintendent. The other two gentlemen are residents of Port Huron.

The North Rolling Mill owned by the Republic Iron & Steel Co., at Terre Haute, Ind., is being overhauled preparatory to resuming operations at an early date. The plant has been idle for some time.

PURCHASE OF SAVAGE FIRE BRICK WORKS.

The stock of the Savage Fire Brick Co., Keystone Junction, Pa., has passed into the hands of Johnstown, Pa., and Pittsburg capitalists in the past week. The control has been held heretofore by J. J. Hoblitzell, Wm. and George Hoblitzel, of Meyersdale, Pa. The consideration was about $250,000. Scott Dibert, of Johnstown, Pa., is the new president; John H. Waters, of Johnstown, vice president and treasurer; Dr. G. W. Wagoner, of Johnstown, treasurer. In addition to these W. S. Ravenscraft, of Ridgway, Pa., and Francis J. Torrance, of Pittsburg, are directors. The property of the Savage Fire Brick Co. consists of the Keystone and Williams plants, in the southeastern portion of Somerset county, and the Hyndman works, in the town of Hyndman, Bedford county, together with 2,207 acres of fire clay and coal lands in the two counties named. During the three years of which a record is at hand, the three plants of the Savage Fire Brick Co. had an annual average output of nearly 15,000,000, but it is likely that the capacity will be materially increased under the new management. The plants are located on the B. & O. and Pennsylvania railroads, and have abundant shipping facilities and are well situated as regards water. The clays are said to be among the best fire clays in the world, the ratio of "flint" to "bond" clays being in the relation required in the mixture for the manufacture of fire brick—66 per cent of the former to 33 per cent of the latter. In addition to the three plants acquired, the controlling interests in the new company have a silica brick plant at Mt. Union, Pa.

The American Steel Foundry Co., St. Louis, Mo., has recently built 20 steel gondola cars for the Caledonian Railway of Scotland. Many features are in accordance with American practice. The capacity is 60,000 lbs. and the light weight is 32,000 lbs. The length over end sills is 36 ft. 5 in., the width outside is 8 ft. 6 in. and the corresponding inside dimensions are 36 ft. 4 in. and 7 ft. 10 in. respectively. The floor is 3 ft. 9¼ in. above the rail and the sides are 4 ft. 2¾ in. high. The center sills are built-up girders, with a ¼-in. web plate, 20-in. deep at the center and 10-in. deep at and beyond the body bolsters. There are no intermediate sills and the sides are designed as deep girders and assist the center sills in transmitting the load to the bolsters. It will be seen that side doors are used. The floor, end and side plates are ¼-in. steel. The end sills and body and truck bolsters are steel castings. The trucks are of the diamond frame type, the standard construction of the builders. Westinghouse air-brakes are used.—[Railroad Gazette.

The Bass Foundry & Machine Co., Fort Wayne, Ind., has been awarded the contract for the installation of a Corliss engine with a capacity of 2,500-h. p. in the Elwood, Ind., plant of the American Tin Plate Co. The engine will have a flywheel weighing nearly 70 tons.

The production at the Bessemer steel plant of the Colorado Fuel & Iron Co., Pueblo, Col., was 19,130 gross tons in the month of March; that of the rail and blooming mill 15,740 gross tons. The rail mill is now working on an order for 20,000 tons of 75-pound rails for the Santa Fe railroad.

PRODUCTION OF OPEN-HEARTH STEEL IN 1901.

The total production of open-hearth steel in the United States in 1901, including direct steel castings, is shown by the American Iron and Steel Association statistics just published, to have been 4,656,309 gross tons, against 3,398,135 tons in 1900, an increase of 1,258,174 tons, or over 37 per cent. The production of open-hearth steel has more than doubled in the last four years, having increased from 2,230,292 tons in 1898 to the figures above given for 1901. The following table gives the production of open-hearth steel ingots and castings, by states, since 1898:

States—Gross tons.	1898.	1899.	1900.	1901.
New England	47,381	57,124	74,522	170,876
N. Y. and N. J.	47,957	61,461	67,361	82,985
Pennsylvania	1,817,521	2,393,811	2,699,502	3,594,763
Ohio	79,886	117,488	130,191	184,943
Illinois	183,103	246,183	285,551	398,522
Other States	54,444	71,279	141,008	224,220
Total	2,230,292	2,947,316	3,398,135	4,656,309

In 1900 our open-hearth steel production for the first time exceeded that of Great Britain, which then amounted to 3,156,050 tons. Great Britain's production in 1900 was the largest in her history. Our open-hearth steel made in 1901 was produced by 90 works in 14 states—Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Delaware, Tennessee, Alabama, Ohio, Indiana, Illinois, Wisconsin, and Missouri. In 1900, 94 works and seventeen states made open-hearth steel. Neither Maryland, Kentucky, Michigan, nor Minnesota produced open-hearth steel in 1901, although all four states were producers in 1900. Rhode Island made open-hearth steel for the first time in 1901.

In 1900 the production of open-hearth steel by the basic process amounted to 2,545,091 tons and by the acid process to 853,044 tons. In 1901 36,18,993 tons were made by the basic process and 1,037,316 tons were made by the acid process, as follows, by states:

States—Gross tons.	Basic open-hearth steel.	Acid open-hearth steel	Total Gross tons
New England	87,539	83,347	170,876
N. Y. and N. J.	46,805	36,180	82,985
Pennsylvania	2,840,230	754,533	3,594,763
Ohio	120,146	64,797	184,943
Illinois	353,395	45,127	398,522
Other States	170,888	53,332	224,220
Total	3,618,993	1,037,316	4,656,309

The total production of open-hearth steel castings in 1901, included above, amounted to 301,622 gross tons, of which 94,941 tons were made by the basic process and 206,681 tons were made by the acid process. In 1900 the production of open-hearth steel castings amounted to 177,491 tons, of which 42,644 tons were made by the basic process and 134,847 tons by the acid process. The following table gives the production of open-hearth steel castings by the acid and basic processes in 1901, by states:

States—Gross tons.	Acid castings.	Basic castings.	Total. Gro Tons
New England, N. Y., and N. J.	33,165	3,989	37,154
Pennsylvania	104,631	3,855	108,486
Ohio, Ind., Ill., and Other States	68,885	87,097	155,982
Total	206,681	94,941	301,622

The following were admitted to membership at the April meeting (April 15) of the Engineers' Society of Western Pennsylvania: Howard L. Bodwell, engineer with the American Sheet Steel Co.; Samuel G. Brigel, assistant engineer, Westinghouse Electric & Manufacturing Co.; Charles H. Clark, structural draughtsman, Jones & Laughlins, Ltd.; William A. Dick, designing electrical engineer, Westinghouse Electric & Manufacturing Co.; P. N. Jones, engineer, Westinghouse Electric & Manufacturing Co.; E. Kaufman, president and general manager, Westmoreland Steel Co.; William M. Kennedy, president Pittsburg & Western railroad; Richard Khuen, Jr., division engineer American Bridge Co.; Herman Laub, civil engineer; H. P. Maxim, vehicle motor department, Westinghouse Electric & Manufacturing Co.; Reuben Miller, general superintendent Crucible Steel Co. of America; R. A. McKinney, purchasing agent, American Sheet Steel Co.; E. M. Olin, electrical engineer, dynamo testing department, Westinghouse Electric & Manufacturing Co.; J. M. Searle, manager General Engineering & Construction Co.; W. MacG. Shiras, assistant ore agent, United States Steel Corporation; Frank H. Taylor, second vice president Westinghouse Electric & Manufacturing Co.; W. T. Wallace, engineer; Henry H. Westinghouse, Westinghouse Air Brake Co.

Proposed Crane Works Consolidation.

The incorporation in New Jersey in the past week of the United States Crane Co., with an authorized capital of $10,000, is considered a step preliminary to the carrying out of plans long on foot. Mention was made in these columns some time ago of the negotiations for the consolidation of various crane manufacturing concerns in the Central West. We know of a number of concerns that have been approached, and it is believed that the work of forming the consolidation is well along. The incorporators of the United States Crane Co. are Edw. T. McLaughlin, Francis D. Pollak, Albert S. Ridley, Henry W. Clark and James C. Converse.

By an agreement entered into last week between the molders and foundrymen of Milwaukee, Wis., the former will receive an advance in wages beginning May 1. Floor molders receive an advance of 10 cents a day making their wages $2.85 and bench molders will be advanced from $2.50 to $2.65.

The new plant of the Bessemer Foundry Co., Grove City, Pa., has been placed in operation and a number of heats have already been cast. The plant is located on the Pittsburg, Bessemer & Lake Erie railroad and sidings facilitate the shipment and delivery of all kinds of material. The foundry is constructed of brick and is 100 feet square. It is commanded by a 10-ton Whiting crane with a 50-foot span. The cupola has a capacity of 10 tons and this will be the limit of the daily output for the present. Plans are also being prepared for a pattern shop which will adjoin the foundry. A specialty will be made of gas engine and machinery castings up to 10 tons. The officers of the company are as follows: Benj. Spearman, president; A. Seaton, vice president; W. H. Christy, secretary, and J. M. Albin, treasurer and general manager.

The Genesee Metal Works, of Rochester, N. Y., were organized on April 1 by Levi Hey, Ernest C. Hazard, Geo. R. Coates, F. W. C. Reidenbach, and John Bennett, well-known residents of Rochester. Mr. Reidenbach, who is the general manager of the company, is well known as the introducer of phosphor tin alloy to the trade. He left the Malta Metal Co., of Rochester, to become connected with the new company, which is manufacturing smelter of various metals, including phosphor tin, phosphor copper, manganese bronze, ingot brass and babbitt metals.

The paragraph in a recent issue referring to the John S. Worthington Co., of Denver, Col., incorrectly stated that G. W. Skinner, Sr., had purchased a half interest. The purchase was made by G. W. Skinner, Jr.

The Toledo Machine & Tool Co., Toledo, O., reports an increasing demand for dies, punch presses, and other sheet metal machinery. Although the company have made large additions to their equipment during the past three years, they are unable to keep pace with their orders and have recently added six large lathes, a heavy combined vertical and horizontal milling machine, and a large, Beaman & Smith, horizontal milling and boring machine.

Stack No. 5, of the Illinois Steel Co., at South Chicago, Ill., has been blown out on account of some repairs being needed. One of the company's furnaces at Union Works, Bridgeport, Ill., was changed last week from speigel to bessemer.

Furnace No. 2, at Middlesboro, Ky., and the furnace at Radford, Pa., owned by the Virginia Iron, Coal & Coke Co., will be blown in shortly. Both furnaces have been extensively repaired.

CONSOLIDATIONS AND THE IRON TRADE.

We take pleasure in laying before our readers the address of Mr. Charles Kirchhoff, editor of the *Iron Age*, delivered at the meeting of the Foundrymen's Association at Philadelphia last week. The assigned subject was "Trusts and Their Effect on the Business World." More particularly Mr. Kirchhoff considered the consolidations in the iron trade:

"I am rather inclined to object to the term 'trust,' since it carries with it in the popular mind the odium of actual or attempted monopoly. It is true that James B. Dill, an eminent authority, describes a trust as a 'dominant combination of money, property, business or commercial power or energy,' and that he emphasizes the 'dominant.' But in the community at large the term trust is coupled with the idea of an effort at monopoly. Personally I prefer the term 'consolidation,' because that describes better the organizations which have recently developed in the iron and allied industries. As a matter of fact, not one of them in the trades referred to can claim or ever hope to secure a monopoly, and we must deal, therefore, with the question to what extent the existence of dominant consolidations affects the industries and trades of which they are a part.

"The movement toward consolidation and concentration is a living force with which every one must learn to count. It is the greatest modern revolution, whose scope and tendencies affect the investor and the workman, the trader and the engineer. Possibly it is still much too early to measure its strength or foresee its direction in the future, but we have been making history rapidly and we may be able to discern even now general tendencies.

"In the iron and allied industries the fear of actual monopoly is disappearing. It can be based only upon the complete control of the mineral resources of the United States and of countries whose mineral products can be made tributary to the manufacturing industries of this country. In the case of coal it is true that the boundaries of the deposits may be accurately ascertained, but their extent in the United States is so vast that the danger that they can be controlled need not trouble anyone in the present generation.

"With iron ore there is the constant risk that new deposits may be discovered, and this applies not alone to this country, but to all countries capable of placing ore cheaply into ocean steamers, because ultimately the duty on iron ore will disappear.

"But it may be urged that it is not necessary to secure actual monopoly. All that is required is control of those deposits which are richest, most cheaply mined or exceptionally well located, and this applies, too, to coal property. The advantages which this possession represents may be measured by dollars per ton of product. But usually thus far these advantages have been capitalized in the purchase; in fact, have generally been overcapitalized. It is certain, too, that the search for and the development of mineral resources has been greatly stimulated.

"Of course there can be no monopoly of the instruments of production proper, of the manufacturing plant, of machinery and of methods, except through patents, which are rather uncertain property. On the contrary, the creation of the consolidations has rather stimulated than it has checked the building of manufacturing plants, in two ways. It has forced existing outside concerns who were making only partly finished goods to pursue the manufacture to the final market product. It has forced makers of finished goods to go back to the raw materials in order to secure independence. It has been tempting moneyed men who sold out to re-enter the business with new equipment, either as a *bona fide* enterprise or to repeat the operation of selling out. Finally it has had the effect of attracting new capital into the business, and in some cases has led large consumers to go into manufacturing to protect themselves against the danger of real or fancied extortion.

"Then the majority of consolidations soon find themselves in the position of themselves increasing productive capacity. Every one of them has fallen heir to rattletraps, which must either be abandoned or remodeled. Every one has a large proportion of plants which require heavy expenditures for new equipment and facilities to bring them up to the standard of the best units.

"So far as the individual producer is concerned, the effect of the establishment of consolidations is to lead to an increase in the manufacturing capacity. While the number of competitors may have been very materially reduced, competition proper may be rendered greater and more dangerous.

"Nearly every one of the consolidations in the iron trade has been seriously overcapitalized. In itself the issue of reams of common stock, to represent so-called good will or presumptive earning capacity, does not mean much. A part of the issue of securities may be justified on the ground that it represents the capitalizing of the economies due to consolidation. These economies are great. They are greater than is generally realized. But even in very favorable cases they cannot give substance to the water that has been poured in, and the management must face the problem of earning a return on greatly inflated expectations, particularly during the period when the financiers are at work creating a market for the paper capital. This condition of affairs is unsound not alone for the particular enterprise, which is a matter of concern only to those directly interested, but also to the industry at large and all those engaged in it. We see nearly every undertaking of this kind staggering under a load of fixed and semi-fixed charges, which invite competition and threaten trouble not only at the financial end, but also to labor and capital in cognate undertakings. We shall see heroic attempts to meet promises and expectations doomed to failure, and by sympathy affecting others besides those directly interested.

"There has been introduced into the American iron trade, through the creation of the consolidations as public companies, an entirely new element, and that is the dealing in stocks on the exchanges. What that means, in the worst form, has been abundantly proved over and over again in connection with the transportation interests of this country. Only lately we have had a striking example nearer home of the close relations between stock gambling and a branch of the metal industry—in copper. For years it has been as important for a consumer to study the quotations for copper stocks as it has been to keep track of the market for the metal. Speculators, often in charge of great mining enterprises, have boomed or depressed the prices of their own product with the sole object of unloading securities or frightening their own fellow stockholders out of their shares. We have not had this experience in its full developed form in the iron trade, but incidents have occurred which are freely charged to that cause. We cannot in any case ignore the fact that some danger does lurk in that direction.

"But after all, what we must consider more particularly is the effect of the modern dominant consolidation upon the manufacturing industries in which it is a power. Let us take first the relations among producers themselves. The reduction in the number of them makes it much more easily possible to get together for the protection of mutual trade interests. This means that agreements are more readily reached and more readily maintained. It is curious that the consolidations to which producers were driven through despair over the failure of trade agreements rather encourage their revival. In other words, the existence of the consolidations makes for more prolonged periods of industrial peace. On the other hand, it is true also that when a conflict does come it is far more intense and temporarily more destructive. The consolidation, covering as it does a wide range of products, can fight with extreme vigor in one branch and draw in sinews of war from others not disturbed. It may single out some territory as the battle ground and destroy those who are dependent upon particular local markets. To the outside producer, particularly the smaller one, the new movement has brought serious dangers.

"So far as the consumers are concerned there has been quite a good deal of complaint in the early stages of the life of the consolidations. Some of them who enjoyed special favors from some individual plant have found that advantage swept aside, and their outcries may be passed over as selfish. But a good many consumers have suffered from the rupture of close business relations of long standing. During the period during which the new organizations were forming there was a good deal of confusion and the service was undoubtedly bad. Little complaint of that kind is now heard of, although the conditions are trying.

"It is a general proposition that the consumer will usually give the outside producers the preference. He believes that his interest is to foster and encourage competition, and he

usually feels that with a small concern his status as a customer is better than it is with an enormous consolidation. The managers of the latter, however, claim that in the long run, year in year out, they can and do give better service, that interruptions of it are less liable to occur and that quality is more reliable.

"So far as the distributing trade is concerned the consolidations show a disposition to deal liberally. By attractive terms and careful protection they are making the jobbers their allies. In many cases they have withdrawn from the direct business with smaller consumers, which the constituent concerns had developed and encouraged. Undoubted abuses have thus been done away with. It is probable that this policy will be continued as being safe and wise.

"As against that the sphere of the broker and commission merchant has been very much narrowed by the creation of the consolidations, who claim that in that direction they have effected economies. What loss the middlemen have suffered in this manner is compensated for to some extent by the newly established plants, of whom many need the experience and the capital of the broker and the commission merchants.

"No data have yet been furnished as to the economies secured by the saving in cross freights, but there can be no doubt that the loss of earnings to the railroads through this source must be very large. There can be little doubt, too, that their importance as shippers of enormous amounts of raw materials and of finished goods must place some of the consolidations in a very different position with the railroads than even the greatest of the constituent companies occupied. It is a fact that outside producers are very apprehensive on this score, since the ramifications of the influence of the modern consolidations in financial and transportation circles are very extensive and very powerful.

"During the present enormous consumption of iron and steel in this country, straining as it does our entire productive capacity, the question of the influence of dominant organizations has been much discussed. It is certain that an earnest and largely successful attempt has been made to hold values steady and to prevent a runaway market, which in the end would inflict injury overbalancing by far the temporary gains from a brief period of boom prices. The enormous power of the leading consolidations has been thoroughly proven during the past few months, but the inference frequently drawn from these events that trusts have the ability to prevent declines below certain limits hardly seems to be warranted.

"The lowest cost of production of goods is not reached at a time when all the plants are run to full capacity, because many of them are poorly equipped or are at a disadvantage in other respects. It is attained when the best part of the capacity is in full operation and the cripples are idle. To that extent, therefore, the consolidations may adjust themselves effectively and profitably to a restriction in the consumption.

"But it has become an axiom almost with our modern captains of industry that the plants must be kept full. When the domestic market cannot supply the tonnage the foreign fields must be invaded. It costs more money to do foreign business, and for many years to come the greater part of the sales will net less. In other words, in most cases export business must be done at a sacrifice. At once the question arises, Who is to bear the burden? It is not likely that any consolidation, however powerful, will be content to allow an increasing share of the more valuable domestic market to fall to the lot of outside competitors, particularly in those branches in which standard products are the same the world over and price alone determines the placing of the order. It is the surplus product which determines the course of the market, be it only an insignificant percentage of the total tonnage. Con-

CARGO ANALYSES OF LAKE SUPERIOR IRON ORE.

The tables below contain complete average cargo analyses of Lake Superior iron ores for the season of 1901. In each case the upper of the two lines of figures opposite the name of the ore represents its analysis when dried at 212 degrees Fahrenheit. The lower line is the analysis of the ore in its natural condition. Where ores are marked with an asterisk (*) the analysis given is the expected analysis for the season of 1902:

GOGEBIC RANGE.

ORE.	Iron	Phos.	Silica	Mang.	Alumina.	Lime	Magnesia.	Sulph'r	Loss by Ignition.	Moist.
Ashland*	61.00	.045	6.85	.240	3.23	.380	.280	.012	2.30	
	54.29	.040	6.09	.213	2.87	.320	.249	.010	2.047	11.00
Anvil*	53.00	.048	5.80	.90	.97	.25	.17	.005	3.02	
	55.03	.0419	5.066	.786	.847	.218	.148	.004	2.637	12.66
Anvil Special*	52.00	.050	5.80	10.00	.97	.25	.17	.005	3.02	
	45.76	.044	5.10	8.80	.85	.22	.149	.004	2.657	12.00
Ardale	56.994	.0554	10.459	.300	4.60	.220	.100	.....	2.82	
	51.0272	.04960	9.3640	.2685	4.118	.1969	.0895	.....	2.524	10.489
Atlantic	61.88	.048	.....	.....	.....	.....	.....	.....	.....	
	55.289	.0428	.....	.....	.....	.....	.....	.....	.....	10.65
Aurora	62.734	.0330	4.764	.370	1.88	.280	.130	.....	2.90	
	55.2360	.02984	4.1946	.3257	1.655	.2465	.1144	.....	2.553	11.952
Best	56.29	.059	12.23	.93	.98	.68	.80	.007	2.90	
	49.23	.0516	10.687	.81	.857	.59	.787	.006	2.53	12.54
Bennie	50.23	.036	12.87	6.01	1.69	.17	.70	.019	4.58	
	45.207	.034	11.31	5.409	1.52	.15	.63	.017	4.12	10.00
Brotherton*	62.80	.028	7.35	.38	1.00	.20	.04	.010	1.15	
	58.25	.0252	6.615	.315	.90	.180	.036	.009	1.035	10.00
Buckeye*	58.14	.084	10.50	.43	2.02	.14	.46	.025	.....	
	51.17	.074	9.24	.38	1.88	.12	.41	.023	.....	12.00
Cary Empire	58.46	.059	4.75	3.02	.97	.12	.14	.012	5.64	
	52.5585	.0530	4.2703	2.7150	.8720	.1078	.1259	.0108	5.0704	10.10
Colby Bessemer*	64.300	.039	2.720	.260	1.020	.160	.210	.006	1.900	
	57.857	.035	2.447	.233	.917	.143	.188	.005	1.709	10.020
Colby No. 1	56.700	.066	3.200	6.820	.880	.160	.400	.006	2.200	
	51.585	.060	2.911	6.204	.800	.145	.363	.005	2.001	9.020
Colby No. 2	60.600	.060	4.000	2.350	1.100	.170	.470	.006	2.150	
	54.061	.072	3.608	2.029	.982	.153	.423	.007	1.939	9.800
Hennepin	59.30	.049	10.10	.36	1.23	.25	.09	.015	2.70	
	53.42	.044	9.099	.32	1.108	.225	.081	.0135	2.43	9.91
Iron Belt*	60.50	.045	8.75	.36	1.50	.35	.39	.030	3.90	
	53.32	.040	7.71	.32	1.32	.31	.34	.027	3.40	11.86
Ironton	61.120	.051	6.700	.920	1.400	.360	.120	.004	2.900	
	54.641	.045	5.989	.822	1.251	.321	.107	.003	2.592	10.600
Jack Pot	52.90	.038	.....	.....	.....	.....	.....	.....	.....	
	46.05	.030	.....	.....	.....	.....	.....	.....	.....	12.95
Lawrence	62.21	.053	4.62	.30	1.34	.10	.11	.018	3.98	
	55.44	.040	4.12	.27	1.20	.17	.10	.016	3.55	10.87
Lyon	58.44	.048	.....	.....	.....	.....	.....	.....	.....	
	53.31	.0447	.....	.....	.....	.....	.....	.....	.....	8.77
Melrose*	62.00	.040	5.35	.95	1.08	.17	.13	.011	3.31	
	56.40	.0357	4.78	.848	.964	.15	.116	.0098	2.957	10.65
Melrose No. 2*	62.00	.070	5.15	.....	1.08	.17	.13	.011	3.31	
	56.40	.062	4.60	.....	.964	.15	.116	.0098	2.957	10.65
Meteor	60.100	.039	8.700	.560	.900	.620	.090	.004	2.260	
	53.639	.034	7.764	.499	.803	.553	.080	.003	2.017	10.760
Mikado	57.29	.151	13.90	.32	1.01	.42	.18	.011	1.85	
	50.3121	.1326	12.2070	.2810	.8870	.3689	.1581	.0097	1.3612	12.18
Montreal*	62.86	.045	4.47	.43	1.18	.20	.13	.012	.....	
	56.15	.040	3.99	.38	1.05	.18	.12	.011	.....	10.68
New Davis*	48.00	.055	11.02	10.00	.....	.....	.....	.....	.....	
	44.16	.051	10.14	9.20	.....	.....	.....	.....	.....	8.00
New Era*	58.00	.035	10.05	.90	1.23	.26	.14	.011	4.41	
	51.27	.0309	8.883	.795	1.087	.229	.12	.0097	3.897	11.61
New Era No. 2*	58.00	.073	10.05	.90	1.23	.26	.14	.011	4.41	
	51.27	.066	8.88	.795	1.087	.229	.12	.0097	3.897	11.61
Newport	53.23	.041	6.24	8.13	.81	.22	.18	.008	5.15	
	47.60	.0366	5.58	7.26	.72	.196	.16	.007	4.60	10.57
Norrie	63.425	.0405	3.994	.400	1.90	.320	.120	.....	2.60	
	56.5662	.03612	3.5620	.3567	1.694	.2853	.1070	.....	2.318	10.814
Norrie Norden	63.995	.0804	2.992	.350	1.48	.240	.090	.....	3.30	
	57.8124	.07263	2.7029	.3161	1.337	.2168	.0813	.....	2.981	9.681
Nordale	58.268	.0362	10.052	.310	3.43	.220	.100	.....	2.66	
	52.2553	.03246	9.0147	.2780	3.076	.1972	.0896	.....	2.385	10.319
Ottawa*	58.10	.067	6.14	2.73	1.58	.05	.16	.005	4.74	
	52.00	.060	5.50	2.43	1.41	.04	.14	.004	4.24	10.50
Ottawa Mang*	54.95	.074	4.25	6.29	1.01	.15	.21	.031	6.50	
	49.18	.066	3.80	5.63	.91	.13	.18	.028	5.81	10.50
Puritan	57.200	.028	6.200	4.020	1.400	.420	.120	.006	2.900	
	50.679	.033	5.493	3.561	1.240	.372	.106	.005	2.569	11.400
Rand	63.43	.0397	2.58	1.99	1.22	.47	.35	.....	2.83	
	55.361	.03465	2.251	1.736	1.064	.410	.305	.....	2.470	12.72
Rowe*	57.00	.040	11.25	.90	.70	.23	.19	.02	2.75	
	49.59	.0348	9.787	.78	.609	.20	.165	.017	2.39	13.00
Sunday Lake*	62.50	.028	7.10	.30	.95	.25	.05	.010	1.04	
	56.25	.0252	6.390	.270	.855	.225	.045	.009	.936	10.00
Taylor*	58.00	.052	8.40	.230	3.52	.260	.150	.014	3.20	
	52.20	.0468	7.56	.207	3.168	.234	.135	.0126	2.88	10.00
Tilden	63.88	.0497	2.99	.77	1.29	.53	.37	.....	2.68	
	55.505	.04318	2.598	.669	1.120	.460	.321	.....	2.328	13.11
Tilden Norden	63.82	.0766	3.00	.76	1.30	.56	.44	.....	2.89	
	55.293	.06549	2.599	.658	1.126	.485	.381	.....	2.243	13.36
Winona	57.200	.046	8.000	2.180	.900	.210	.090	.006	2.180	
	51.036	.041	7.152	1.948	.804	.187	.080	.005	1.948	10.600

MARQUETTE RANGE.

ORE.	Iron	Phos.	Silica	Mang.	Alumina	Lime	Magnesia	Sulph'r	Loss by Ignition	Moist.
Abbotsford	62.88	.030	7.41	.13	1.59	.112	.151	.....	.33	
	62.053	.0296	7.312	.128	1.569	.1106	.1490	.....	.325	1.315
Alford	63.70	.048	5.86	.26	1.64	.149	.169	.....	1.05	
	56.861	.0428	5.229	.232	1.463	.1329	.1508	.....	.937	10.751
Angeline, Hard	67.41	.011	.....	.....	.....	.....	.....	.....	.....	
	63.64	.010	.....	.....	.....	.....	.....	.....	.....	5.57
Angeline, Hard No. 1 B	67.18	.014	.....	.....	.....	.....	.....	.....	.....	
	64.49	.013	.....	.....	.....	.....	.....	.....	.....	4.00
Angeline, Hematite	65.13	.041	.....	.....	.....	.....	.....	.....	.....	
	57.85	.036	.....	.....	.....	.....	.....	.....	.....	11.17
Angeline, South	61.70	.079	6.85	.32	1.82	.25	.13	.022	3.67	
	54.94	.070	6.10	.28	1.35	.22	.12	.020	3.27	10.96
Averhart*	61.47	.020	9.97	.....	.....	.....	.....	.....	.....	
	59.472	.0193	9.645	.....	.....	.....	.....	.....	.....	3.23
Barrow	42.43	.040	33.46	.....	.....	.....	.....	.....	.....	
	38.90	.037	30.68	.....	.....	.....	.....	.....	.....	8.31
Beaufort	52.00	.257	5.07	.24	.95	3.42	2.63	.086	11.65	
	47.94	.237	4.68	.22	.90	3.15	2.43	.079	10.77	7.79
Bessie*	53.47	.432	12.07	.....	.....	.....	.....	.....	.....	
	51.732	.4179	11.677	.....	.....	.....	.....	.....	.....	3.25
Bell	40.00	.034	38.25	.21	1.28	.13	.16	.028	2.29	
	39.00	.033	37.38	.20	1.25	.127	.156	.027	2.238	2.26

Bedford	60.16	.140	7.80	.61	1.26	.226	.616	.....	2.38			
	53.301	.1240	6.910	.540	1.116	.2008	.4566	.....	2.906	11.40		
Beresford	63.47	.108	4.97	.12	2.48	.292	.432	.....	.42			
	63.051	.1053	4.939	.129	2.464	.2961	.4263	.....	.437	.612		
Beresford Lump	64.60	.107	3.51	.13	2.22	.335	.376	.....	.40			
	64.340	.1064	3.490	.129	2.207	.3331	.3738	.....	.397	.556		
Bernhart*	58.02	.075	9.04	.....	.....	.....	.....	.....	.....			
	53.903	.0697	8.413	.....	.....	.....	.....	.....	.....	0.94		
Bigelow	51.00	.060	23.04	.12	2.10	.26	.12	.016	2.58			
	46.41	.045	20.056	.109	1.91	.236	.109	.014	2.30	9.00		
Buffalo	61.65	.089	5.05	.309	2.74	.04	.017	.091	1.979			
	54.202	.0870	4.439	.2716	2.409	.036	.7183	.0800	1.7399	12.080		
Cambria*	60.41	.053	5.64	.98	2.63	.90	.32	.010	2.71			
	53.668	.047	5.90	.87	2.337	.80	.28	.0088	2.408	11.11		
Cambridge	59.50	.068	6.03	.715	1.513	1.80	.461	.010	1.97			
	50.66	.568	5.13	.611	1.288	1.53	.392	.008	1.66	14.85		
Cameo	58.98	.1009	7.03	.313	4.84	1.17	1.06	.100	2.511			
	51.316	.08015	6.211	.2765	4.276	1.033	.936	.0963	2.2145	11.645		
Castleford	56.90	.087	13.80	.13	2.75	.279	.447	.....	.52			
	56.234	.0859	13.638	.128	2.717	.2757	.4417	.....	.513	1.170		
Champion No. 1 Crushed*	64.00	.060	4.65	.20	2.38	.23	.29	.013	.....			
	63.49	.0595	4.61	.198	2.36	.317	.288	.0129	.....	.80		
Champion B Crushed*	60.30	.068	8.96	.23	2.78	.36	.28	.018	.....			
	59.73	.0674	8.87	.228	2.75	.376	.288	.0178	.....	.95		
Champion, Hematite	52.35	.397	9.94	.26	1.67	3.16	1.81	.052	6.35			
	47.76	.363	8.90	.256	1.53	2.90	1.65	.048	5.80	8.60		
Chatford	50.96	.114	21.10	.31	1.35	.186	.189	.....	3.39			
	46.780	.1045	19.357	.284	1.238	.1706	.1350	.....	3.109	8.280		
Chester No. 1	45.35	.081	28.54	.33	1.75	.89	.65	.009	1.78			
	41.85	.0567	26.5422	.3069	1.6275	.8277	.6045	.0083	1.6554	6.95		
Chester No. 2	40.80	.030	36.16	.478	1.422	.23	.295	.006	2.12			
	38.72	.02805	33.809	.4469	1.3296	.2057	.2338	.0056	1.982	6.80		
Cliffs Shaft, Crushed	61.90	.098	4.48	.24	2.19	1.28	.97	.021	.63			
	61.34	.0960	4.43	.237	2.166	1.266	.919	.0207	.623	1.66		
Cliffs Shaft, Lump	63.49	.087	3.30	.25	1.88	1.23	.84	.019	.56			
	63.22	.0866	3.288	.248	1.872	1.224	.838	.0189	.557	.43		
Comrade*	55.10	.112	12.36	.106	4.15	.561	1.98	.025	1.29			
	54.50	.1107	12.23	.1048	4.10	.555	1.96	.0247	1.275	1.09		
Derbart*	47.01	.020	29.91	.....	.....	.....	.....	.....	.....			
	45.590	.0193	29.000	.....	.....	.....	.....	.....	.....	2.02		
East New York	59.38	.046	9.17	.14	2.48	.39	.41	.017	1.77			
	52.759	.0408	8.147	.12	2.20	.346	.36	.015	1.57	11.15		
Imperial*	52.44	.256	13.49	.198	1.20	1.37	1.39	.011	7.38			
	47.03	.229	12.10	.177	1.076	1.228	1.246	.009	6.62	10.32		
Jackson, South	42.50	.062	29.60	2.82	1.65	.14	.07	.018	3.50			
	38.9428	.0751	27.1225	2.5840	1.5119	.1283	.0641	.0165	3.2071	6.37		
Lake	59.70	.125	5.73	.490	2.82	.50	.54	.013	3.71			
	51.90	.1086	4.981	.425	2.451	.434	.469	.0113	3.225	13.07		
Lake Bessemer	54.03	.040	5.26	.230	1.25	.280	.120	.011	1.50			
	50.48	.035	4.64	.203	1.10	.229	.114	.009	1.32	11.79		
Lillie	60.85	.085	6.16	.34	2.10	.41	.09	.013	3.34			
	53.35	.074	5.388	.297	1.837	.358	.078	.0110	2.92	12.82		
Michigamme	59.20	.104	11.70	.19	2.23	.84	1.01	.025	.150			
	58.45	.102	11.54	.187	2.20	.829	.997	.024	.148	1.26		
Mitchell	60.88	.156	.....	.....	.....	.....	.....	.....	.....			
	53.88	.138	.....	.....	.....	.....	.....	.....	.....	11.50		
Moore*	41.60	.019	37.48	.29	1.31	.69	.48	.035	.42			
	40.457	.0184	36.420	.282	1.176	.671	.466	.0340	.408	2.747		
Negaunee *	59.60	.062	7.4	.35	2.88	.99	.608	.067	1.98			
	53.815	.0549	6.68	.310	2.552	.877	.5387	.0593	1.754	11.383		
Norfolk, Bes. Crushed	55.55	.055	15.26	.27	3.35	.38	.21	.034	.15			
	54.91	.0543	15.08	.267	3.31	.376	.208	.0336	.148	1.15		
Norfolk, Non Bes. Crushed	57.17	.126	13.91	.27	3.08	.38	.21	.034	.15			
	56.51	.1245	13.75	.267	3.04	.376	.208	.0336	.148	1.15		
Princeton No. 1	64.40	.047	2.30	.43	1.37	1.05	.93	.021	1.60			
	53.94	.039	1.926	.36	1.147	.879	.778	.017	1.34	16.24		
Princeton No. 2	60.27	.124	7.70	.57	1.80	.65	.618	.016	1.98			
	49.95	.102	6.38	.46	1.23	.538	.429	.013	1.64	17.12		
Republic, Crushed*	65.50	.046	4.00	.....	.....	.....	.....	.....	.....			
	64.84	.0455	3.960	.....	.....	.....	.....	.....	.....	1.00		
Republic Kingston	62.62	.045	7.21	.13	1.42	.42	.20	.027	.31			
	61.94	.0445	7.132	.118	1.404	.415	.198	.0267	.308	1.08		
Republic Magnetic(N.B.)*	69.00	.....	2.50	.147	.604	.20	.216	.021	.46			
	68.31	.....	2.47	.145	.657	.198	.213	.0207	.455	1.00		
Republic Specular	67.41	.040	2.31	Trace	.747	.22	.15	.025	.23			
	66.74	.0396	2.288	Trace	.7395	.217	.148	.0247	.227	1.00		
Richmond	43.000	.034	36.200	.040	.640	.460	.110	.004	2.740			
	43.046	.033	33.740	.039	.631	.483	.108	.003	2.705	1.270		
Rose	60.50	.150	6.41	.33	2.45	.50	.18	.029	3.16			
	54.45	.135	5.769	.297	2.20	.45	.16	.026	1.94	10.00		
Salisbury	60.42	.112	7.00	.29	2.31	.54	.88	.013	2.22			
	59.56	.097	6.089	.252	2.009	.487	.487	.0104	1.931	13.01		
Scotch*	58.50	.122	10.19	.105	3.92	.786	.674	.019	.730			
	57.92	.1207	10.08	.104	3.88	.780	.665	.0188	.722	1.00		
Sheffield	59.72	.028	.....	.....	.....	.....	.....	.....	.....			
	57.45	.027	.....	.....	.....	.....	.....	.....	.....	3.50		
Tilden Silica	42.10	.031	38.10	.06	.83	.25	.10	.010	.27			
	41.35	.030	37.42	.058	.815	.24	.098	.0098	.265	1.75		

MENOMINEE RANGE.

ORE.	Iron	Phos.	Silica	Mang.	Alumina	Lime	Magnesia	Sulph'r	Loss by Ignition	Moist.
Atfield	60.58	.055	6.18	.078	2.48	.84	.62	.22	2.42	
	54.402	.0493	5.549	.0700	2.227	.754	.556	.197	2.173	10.197
Armenia	59.700	.228	6.950	.200	1.180	2.100	1.020	.004	3.100	
	52.653	.202	6.234	.179	1.058	1.904	.914	.003	2.780	10.300
Ajax	52.10	.0575	14.60	.4272	1.78	1.55	3.34	.005	2.70	
	48.677	.0537	13.640	.3991	1.664	1.448	3.120	.0046	2.522	6.57
Bangor*	59.00	.46	6.80	.23	1.99	.61	.90	.050	4.15	
	51.92	.40	5.72	.20	1.75	.536	.79	.044	3.65	12.00
Baltic	59.35	.456	3.79	.26	3.13	.39	.43	.052	5.85	
	53.9195	.4143	3.4432	.2362	2.8436	.3543	.3907	.0472	5.0422	9.15
Barfield	58.57	.074	8.15	.129	2.68	.924	.67	.234	3.10	
	52.363	.0661	7.286	.1153	2.396	.8260	.599	.2092	2.771	10.597
Barton	59.09	.416	4.71	.640	2.32	.66	.533	.038	5.30	
	58.460	.3974	4.500	.6115	2.216	.630	.5092	.033	5.255	4.45
Basic	56.880	.380	4.140	4.900	1.620	2.200	1.180	.006	2.900	
	52.557	.332	3.825	4.527	1.524	2.032	1.090	.006	2.679	7.000
Bristol	58.70	.495	5.24	.94	1.83	1.34	.50	.032	6.72	
	52.43	.458	4.85	.87	1.69	1.42	.46	.030	6.21	7.50
Brunswick	57.81	.520	4.86	.230	3.10	1.37	.853	.016	4.44	
	50.820	.4571	4.272	.2197	2.725	1.204	.7498	.0140	3.903	13.09
Chapin	59.30	.0615	8.35	.4124	1.17	1.34	2.87	.004	2.55	
	55.368	.0574	7.835	.3850	1.092	1.251	2.679	.0037	2.380	6.68
Clearfield	59.18	.047	6.13	.067	2.37	1.43	.99	.495	3.43	
	52.377	.0418	5.423	.0593	2.097	1.309	.810	.4380	3.035	11.493
Clifford	41.00	.012	39.79	.12	.31	.20	.09	.010	.68	
	39.85	.012	38.67	.12	.70	.19	.09	.009	.66	2.62
Crystal Falls	58.650	.772	4.270	.380	1.820	2.600	1.060	.008	2.200	
	53.606	.705	3.902	.347	1.662	2.376	.968	.005	2.010	8.600
Davidson*	56.06	.130	7.29	.35	3.76	1.08	2.85	.120	.....	
	49.89	.116	6.49	.31	3.35	.96	2.50	.106	.....	11.00
Davy*	41.50	.021	38.08	.08	.33	.60	.85	.02	.66	
	41.08	.0207	37.699	.070	.326	.59	.84	.019	.65	1.00
Florence	55.00	.202	6.05	.50	2.95	2.30	3.34	.11	5.23	
	49.87	.204	5.486	.45	2.55	2.05	3.028	.099	4.74	9.32
Granada	60.75	.0605	5.35	.153	1.39	.98	3.17	.019	2.17	
	56.029	.0557	4.934	.1411	1.281	.903	2.923	.0175	2.001	7.77
Gray	43.91	.038	23.88	.53	1.91	.....	.....	.062	4.70	
	43.466	.0376	23.638	.534	1.890	.....	.....	.0613	4.652	1.01
Groveland No. 1	52.030	.046	10.870	1.370	2.700	6.200	4.720	.008	3.280	
	48.700	.043	10.174	1.282	2.527	5.803	4.417	.007	3.051	6.400
Groveland No. 2*	51.100	.058	19.070	1.530	3.090	2.850	4.680	.018	6.300	
	47.931	.054	17.887	1.435	2.898	2.673	4.389	.016	5.909	6.200
Great Western	59.040	.327	6.800	.900	1.760	2.180	.960	.007	2.970	
	53.903	.298	6.208	.821	1.606	1.990	.876	.006	2.711	8.700
Hemlock	55.97	.287	6.14	.32	2.85	2.36	1.89	.012	4.50	
	53.3450	.2449	5.8520	.3050	2.7449	2.2493	1.8014	.0114	4.2890	4.69
Hiawatha	57.34	.184	7.08	.46	1.60	.330	.28	.017	.....	
	53.326	.1711	6.584	.42	1.488	.3020	.2604	.0158	.....	7.00
Hope*	59.00	.325	8.00	.....	.....	.....	.....	.....	.....	
	51.920	.2860	7.040	.....	.....	.....	.....	.....	.....	12.00
Keel Ridge*	40.64	.040	37.42	.20	.80	1.35	1.00	.006	.....	
	39.46	.045	36.33	.19	.87	1.31	.97	.008	.....	2.90

solidations may have the advantage of lowest cost of production, but it is a question open to doubt whether, when the fixed charges are added, they are in a much better position than many outside competitors.

"Let me say right here that there is a good deal of loose talk about fixed charges, and that they are generally overstated, taking the tonnage as a basis. It is a very familiar method, for instance, in the case of the United States Steel Corporation to figure out the annual interest and preferred stock charges and divide that by a guess at the annual product of steel, this making a 'fixed charge' of $5 or $6 or $7 per gross ton. Such figures look very formidable when applied to rails or bars or other coarser goods. But the corporation make a very large tonnage of more highly finished goods up to the finest music wire, so that it is a fallacious argument to base comparisons of fixed charges on crude steel tonnage.

"Returning from this digression, the question remains, How are the consolidations to deal with the growing competition?

"It may be urged that the consolidations will be driven, through the fact that it is the line of least resistance, to acquire outside plants. This is certainly a simple way, but there is a limit to it. It is not always an attractive proposition to retire from business or become a subordinate of a huge organization, and the price set upon undertakings so controlled is likely to be high. A well recognized disposition to acquire competing concerns would encourage a disposition toward speculative building, which it would take a good deal of expensive punishment to dispel.

"As I understand the situation, it is the aim of the managers of different consolidations who have expressed their views to steadily reduce costs by perfecting their organization and their equipment. As to the former, it does not seem that the difficulties are any more serious than those which are encountered by some of our enormous railroad systems, with their varied commercial, technical and operating interests. As to equipment, the majority of American managers may be trusted not to sin in the direction of dangerous conservatism.

"But as one of the great leaders in the iron industry puts it, a 'trust' must not alone aim at progressive reductions in cost, but must also share the economies thus secured with the consumer if it is not to suffer serious checks in its career. It is too early yet to judge whether that policy will be pursued, but it seems the only course to keep competition in bounds.

"There is the choice, therefore, of two alternatives in the case of overburdened 'trusts;' either to hold down selling values so low that it discourages newcomers into the field—and in that case a good many will find it difficult to pay fixed charges and practically impossible to earn dividends on watered stock—or to lead a merry life while favorable conditions last, charge high prices, make large profits, divide earnings, sell out to the public, and let the future take care of the particular industry and everybody and everything connected with it. These are the Scylla and Charybdis of the trusts. There is a channel between the two, but it will take extremely skillful navigators to bring the ship through safely.

"And right here we encounter what many consider the most important point in connection with the modern consolidations, and that is the question as to the personality of the leadership. If thus far in our industrial development the one all important point has been efficient, progressive, able management, then the need of it has become infinitely more imperative. Will always the right general of industry reach the command? When he does the huge modern consolidation will be an immediate success, which will last beyond his lifetime. When a man of inferior caliber takes the helm we will witness shipwreck and serious suffering. It may be necessary to rebuild on new lines again and again. Our recent industrial history has in other branches

proven emphatically that the danger does exist. When the days of trial do come, and they must, there will be reorganizations. The present consolidation era has not ushered in the industrial millennium. We are the leaders in this new phase of industrial progress, but we have to go through a serious school of experience before we shall have learned to handle effectively this enormously powerful engine of production."

NATIONAL ASSOCIATION OF MANUFACTURERS.

The following is an abstract of the annual report presented at the seventh annual convention of the National Association of Manufacturers in Indianapolis, April 15, by President Theodore C. Search, of Philadelphia:

Calling attention to the declining exports of American manufactured products, President Search urged manufacturers not to neglect their foreign customers in this era of extraordinary home demand, lest in times of depression they should find their foreign trade destroyed and no export outlets for the surplus of an overstocked home market.

Reciprocity was one of the chief topics of the report and the work of the National Reciprocity Convention, which was held in Washington last November under the auspices of the association, was reviewed at length. Mr. Search maintained that the Washington convention was thoroughly representative of the manufacturing interests of the country and its action indicative of the true sentiments of the manufacturers concerning reciprocity. Assuming the doubtful chances of any action on the pending treaties of reciprocity with France and Argentina, he declared that further development of the reciprocal trade idea depended upon the possibilities of special legislation like that for which the proposed concession to Cuba affords a precedent. Mr. Search said:

"The concrete proposition which now confronts us appears to me to be about like this: Is it feasible, safe and expedient to undertake to adjust our commercial relations with other nations by means of special legislation, dealing with each particular case, or is it preferable from all points of view to seek the same end by delegating to the executive arm of the government the power to negotiate international agreements for reciprocal concessions.

"Our treatment of the Cuban problem furnishes the precedent for the new departure in reciprocity; but while we recognize certain obvious advantages in this plan we must not close our eyes to the dangers that lie in such a course. We must recognize that such a method of procedure practically invites a continuous tinkering of the tariff, the possibilities of which we can view only with distrust and alarm."

With regard to the proposition to create a new Federal Department, Mr. Search expressed gratification at the progress that had been made towards the passage of the Nelson bill, and urged more energetic personal support of the measure by the individual members of the association.

The principle of direct government aid to the merchant marine, as embodied in the pending ship subsidy bill, was commended to the association.

Concerning Isthmian canal projects Mr. Search took the position that the people really cared but little whether the Panama or the Nicaragua route should be chosen, so long as some decisive action should be taken by Congress which would advance the matter to the point of actual undertaking of the construction of an interoceanic waterway.

The pending bills for the reorganization of the consular service on practical business lines were recommended for approval by the association.

The attention of the association was directed to the pending eight-hour bill and the "anti-injunction bill," both of which Mr. Search said very gravely concerned the interests of the manufacturers of the country, and should not be permitted to become laws

MENOMINEE RANGE—Continued.

ORE	Iron	Phos.	Silica	Mang.	Alum.	Lime	Magn'a	Sulph'r	Loss by Ignition	Moist.
Kimball*	57.200	.600	4.200	.210	1.600	2.600	1.890	.006	3.020	
	52.624	.607	3.956	.193	1.472	2.392	1.656	.005	2.778	6.000
Lamont	57.600	.720	4.150	.560	1.240	2.610	1.100	.006	2.100	
	52.704	.658	3.797	.530	1.134	2.354	1.006	.005	1.921	8.500
Lerida	61.65	.0353	5.22	.131	1.36	.82	2.25	.015	2.08	
	56.810	.0786	4.810	.1307	1.253	.847	2.073	.0138	1.916	7.85
Lincoln	58.800	.340	6.900	.660	1.800	1.600	1.150	.008	2.720	
	54.037	.312	6.341	.606	1.654	1.470	1.084	.007	2.499	8.100
Loretto	39.00	.022	11.16	.17	1.71	.43	.70	.023	.79	
	33.60	.0189	10.139	.15	1.55	.39	.636	.0208	.717	9.14
Manganate	51.55	.550	6.05	3.30	2.78	2.08	1.60	.042	7.34	
	47.73	.509	5.60	3.06	2.57	1.93	1.48	.038	6.80	7.41
Monongahela, Non-Bess.	52.33	.109	15.59	.23	3.84	.29	.50	.020	3.80	
	47.25	.098	14.05	.21	3.47	.26	.45	.018	3.16	9.70
Michigan No. 1*	57.50	.225	4.50							
	53.762	.2103	4.207							6.50
Michigan No. 2*	53.50	.325	7.50							
	48.685	.2957	6.825							9.00
Paint River*	57.400	.660	6.100	.400	1.900	1.960	1.410	.008	3.600	
	51.086	.587	5.429	.356	1.691	1.744	1.254	.007	3.204	11.000
Pewabic	54.37	.012	4.75	.13	.99	.57	1.22	.001	1.03	
	50.3491	.0110	4.3795	.1199	.9128	.5255	1.1248	.0009	.9497	7.80
Pewabic Genoa	43.21	.010	30.69	.10	1.62	.73	1.37	.005	1.29	
	40.6530	.0094	28.8732	.0941	1.5241	.6774	1.2889	.0047	1.2138	5.92
Quinnesec No. 1.*	62.100	.034	4.020	.220	.900	.200	.220	.008	2.200	
	58.684	.032	3.798	.207	.567	.189	.207	.005	2.079	5.500
Quinnesec Non-Bess.	62.200	.112	4.100	.210	.700	.200	.200	.006	2.180	
	59.002	.106	3.889	.199	.664	.189	.246	.005	2.067	5.140
Quinnesec (Silicious-Bess.)	44.800	.032	30.100	.120	1.090	.260	.380	.004	2.720	
	43.823	.031	29.443	.117	1.066	.254	.371	.003	2.660	2.180
Russell	54.40	.081	9.66	.37	2.56	2.35	3.40	.019	3.20	
	50.12	.056	8.90	.34	2.358	2.16	3.13	.017	2.948	7.80
San Jose	65.40	.014	3.64	.16	1.18	.24	.38	.013	.52	
	59.827	.0128	3.329	.146	1.079	.219	.347	.0118	.47	8.52
Tobin*	60.180	.240	6.600	.220	1.410	1.320	.990	.004	2.920	
	55.004	.219	5.849	.201	1.288	1.206	.905	.003	2.668	8.600
Toledo	55.01	.012	16.44	.11	1.36	.81	1.36	.004	1.31	
	51.0548	.0111	15.2580	.1021	1.2622	.7518	1.2622	.0037	1.2158	7.19
Tyrone	59.87	.073	7.46	.16	1.37	1.66	2.45	.002	2.66	
	55.6492	.06785	6.9341	.1487	1.2734	1.5430	2.2773	.0019	2.4725	7.05
Vivian*	42.00	.008	36.42	.10	1.07	.80	.99	.002	.86	
Walpole	57.61	.118	9.82	.15	2.324	.22	1.23	.003	2.05	
	53.9287	.1105	9.1935	.1404	2.1718	.2059	1.1514	.0028	1.9190	6.39

MESABI RANGE.

ORE	Iron	Phos.	Silica	Mang.	Alumina	Lime	Magnesia	Sulph'r	Loss by Ignition	Moist.
Adams	62.75	.034	3.49	.706	1.08	.148	.090	.083	4.87	
	56.710	.0307	3.154	.6381	.976	.1337	.0723	.0587	4.130	9.61
Adams Special	63.81	.032	3.09	.574	1.30	.119	.079	.047	3.87	
	57.497	.0289	2.793	.5188	1.175	.1075	.0714	.0424	3.498	9.61
Adams No. 2	59.93	.069	4.09	.662	2.29	.130	.088	.073	6.79	
	50.940	.0586	3.478	.5627	1.946	.1105	.0748	.0620	5.771	15.00
Admiral	63.800	.027	4.900	.300	.620	.230	.180	.006	2.140	
	58.823	.024	4.517	.276	.571	.212	.165	.005	1.973	7.800
Atlas	60.52	.057	5.70	1.07	1.03	.30	.10	.013	4.73	
	54.2228	.0511	5.1061	.9585	.9227	.1792	.0896	.0116	4.2371	10.42
Audrey	61.68	.054	4.20	.54	2.30	.38	.20	.002	4.16	
	53.311	.0466	3.631	.466	1.988	.328	.172	.0017	3.596	13.54
Beaver	63.85	.076	2.35	.33	1.54	.18	.12	.011	3.95	
	57.24	.0699	2.108	.29	1.38	.16	.107	.0098	3.54	10.35
Biwabik	63.85	.038	3.10	.45	.95	.19	.11	.009	4.13	
	58.64	.035	2.86	.415	.874	.175	.10	.008	3.81	7.72
Butler	62.59	.053	2.52	.50	1.02	.41	.28	.015	5.08	
	58.88	.048	2.29	.454	.926	.372	.254	.013	4.67	9.12
Chisholm*	54.30	.039	3.36	1.15	1.02	.18	.20	.006		
	57.471	.0348	3.003	1.027	.911	.160	.178	.0053		10.62
Clark*	62.82	.034	4.68	1.04	.96	.23	.18	.005		
	56.148	.0303	4.182	.929	.858	.205	.169	.0044		10.62
Commodore	63.100	.039	4.150	.300	1.210	.240	.060	.004	3.400	
	57.231	.035	3.764	.181	1.097	.217	.054	.003	3.083	9.300
Columbia	57.52	.066	8.80	.56	3.94	.13	.13	.016	4.58	
	49.28	.056	7.62	.48	3.37	.11	.11	.014	3.92	14.33
Corsica*	61.00	.045								
	54.21	.0400								11.10
Croxton*	60.09	.060								
	54.60	.0546								9.00
Dailey*	61.03	.038	6.11	.71	.92	.21	.18	.043	5.17	
	51.51	.032	5.157	.599	.776	.177	.15	.036	4.36	15.59
Duluth	59.93	.053	5.23	.883	1.62	.118	.109	.010	6.33	
	52.492	.0464	4.580	.7734	1.418	.1033	.0954	.0087	5.544	12.41
Elba	61.70	.039	3.84	.93	.89	.10	.17	.010	5.20	
	55.7891	.03526	3.4721	.8400	.8047	.0904	.1537	.0090	4.7018	9.58
Fayal	63.80	.037	2.93	.65	.75	.40	.15	.004	3.69	
	57.860	.0335	2.675	.589	.680	.362	.136	.0036	3.346	9.31
Franklin	60.035	.0381								
	55.558	.0352								7.457
Geneva	62.88	.032	4.62	.46	.77	.44	.22	.007	3.44	
	56.453	.0287	4.147	.412	.691	.395	.197	.0062	3.088	10.22
Hartley	63.45	.042	3.65	.552	1.24	.150	.028	.008	3.50	
	57.606	.0381	3.313	.5011	1.125	.1361	.0254	.0072	3.177	9.21
Hibbing	64.62	.033	2.84	.507	1.32	.155	.083	.007	2.56	
	57.599	.0295	2.544	.4542	1.182	.1388	.0741	.0062	2.293	10.40
Island	61.40	.066	3.43	.86	.91	.49	.23	.013	5.96	
	54.179	.0582	3.026	.494	.802	.432	.202	.0114	5.259	11.76
Jordan*	63.600	.039	4.200	.260	1.050	.280	.180	.006	2.760	
	57.685	.053	3.809	.235	.932	.253	.163	.005	2.503	9.300
Juniata	61.45	.054	5.35	.280	2.43	.115	.075	.011	2.67	
	53.305	.0468	4.640	.2428	2.107	.0997	.0650	.0095	3.166	13.254
Kanawha and Hale	59.10	.089	6.78	.45	1.19	.95	.14	.010	2.09	
	53.0718	.0819	7.884	.4041	1.0686	.8531	.1257	.0089	1.8768	10.20
Longyear Bessemer*	61.00	.050								
	55.51	.0455								9.00
Longyear Non-Bessemer*	60.00	.070	6.50	.49	1.21	.25	.17	.010		
	54.60	.0637	5.915	.4459	1.0931	.2275	.1547	.0091		9.00
Mahoning	64.66	.047	2.45	.29	1.46	.14	.12	.008	2.97	
	57.93	.042	2.19	.349	1.308	.12	.107	.007	2.66	10.40
Malta	63.52	.030	4.70	.78	.63	.12	.12	.013	2.80	
	58.1536	.02747	4.3029	.7141	.5768	.1099	.1099	.0119	2.5634	8.45
Minorca*	61.73	.032								
Morrow*	60.00	.060	5.50	.47	1.32	.12	.09	.027		
	54.90	.0549	5.0325	.43	1.3078	.1098	.0732	.0247		8.50
Mountain	63.78	.0415	3.95	.219	1.95	.106	.070	.014	2.35	
	55.839	.03632	3.457	.1917	1.707	.0927	.0613	.0122	2.057	12.459
Oliver	63.84	.0498	4.63	.232	2.18	.096	.087	.015	3.04	
	54.702	.04348	4.043	.2026	1.903	.0838	.0759	.0130	2.654	12.671
Pearce*	62.00	.035	3.17	1.10	1.01	.18	.20	.007		
	56.70	.0315	2.853	.990	.909	.162	.180	.0063		10.00
Penobscot	59.82	.040	7.22	.88	1.93	.20	.14	.10	3.53	
	53.18	.035	6.419	.78	1.71	.177	.12	.088	3.138	11.09
Pillsbury No. 1	62.07	.030	4.28	.507	1.23	.080	.171	.008	4.84	
	56.707	.0274	3.910	.4631	1.123	.0822	.1562	.0072	4.421	8.64
Pillsbury No. 2	59.04	.045	4.92	.760	1.28	.118	.315	.010	8.23	
	52.191	.0466	4.349	.6630	1.131	.1043	.1900	.0088	7.275	11.60
Preble	60.67	.063	6.32	.325	2.63	.116	.065	.013	3.63	
	52.412	.0544	5.373	.2807	2.272	.1002	.0561	.0112	2.135	13.611
Roberts	60.95	.025	7.80	.45	1.13	.25	.08	.040	2.10	
	55.535	.0227	7.106	.4099	1.0294	.2277	.0728	.0364	1.9131	8.90
Sauntry No. 1*	61.66	.053	5.94	.50	1.88	.21	.11	.006		
	56.231	.0483	5.414	.455	1.713	.191	.109	.0054		8.85
Sauntry No. 2*	61.84	.079	6.03	.80	2.07	.29	.11	.005		
	56.184	.0720	5.496	.729	1.886	.264	.102	.0045		8.85
Shilling	62.17	.062	2.78	.53	1.06	.22	.07	.013	6.09	
	55.25	.055	2.47	.47	.942	.195	.06	.011	5.41	11.13
Sparta	61.63	.025	7.75	.40	.99	.15	.26	.019	2.35	
	56.3298	.02285	7.0835	.3656	.9307	.1371	.2376	.0174	2.1479	8.60

without having been most carefully considered in their bearing upon manufacturing interests.

What had been done during the year to protect members against the imposition of unconstitutional taxes and license fees under the foreign corporation laws of the various states was reported and members were urged to resist such discriminating and unjust demands.

The appointment of a permanent committee on Interstate Commerce Law was recommended as a means of aiding the movement to secure desired amendments of this act. Commercial education was discussed at considerable length, and Mr. Search recommended that the association should consider the feasibility of organizing a system of examination and certification of commercial students upon their completion of prescribed courses of study, or the establishment of correspondence courses of instruction as alternative plans to meet the prevailing desire for larger facilities for instruction in practical business methods, more particularly those entering into international trade.

Mr. Search discussed with much emphasis the needs of the association as demonstrated by the six years of his presidency. He said that the prevailing prosperity of the manufacturers and the concentration of their attention upon the problems of extraordinary business activity made it exceedingly difficult to command their support of such broad work as that for which the association was formed. The greatest need of the organization was a larger income with which to carry on the increasing volume of work and he advocated the increase of the annual fee from $50 to $100.

As a means of increasing the influence and prestige of the association, Mr. Search suggested the holding of semi-annual conventions of manufacturers and merchants for the consideration of special topics; such, for example, as methods of extending export trade. He also recommended the subdivision of the work of the association among a number of committees, a plan which he believed would give larger results and tend to strengthen the organization in many ways.

MESABI RANGE—Continued.

ORE	Iron	Phos.	Silica	Mang.	Alum'a	Lime	Magn'a	Sulph'r	Loss by Ignition	Moist.
Stephens*	60.00	.070	3.75	.....	.....	.....	.....	.....	.....	10.00
	54.000	.0630	3.375	.....	.....	.....	.....	.....	.....	
Stone	62.64	.037	2.46	1.07	1.22	.12	.05	.007	4.87	7.82
	57.86	.034	2.30	.988	1.127	.11	.046	.006	4.498	
Stevenson	64.880	.036	3.020	.310	.720	.260	.180	.004	2.720	8.300
	59.504	.033	2.769	.284	.660	.238	.165	.004	2.494	
Thompson	63.01	.036	3.34	.607	.82	.165	.113	.027	4.66	11.76
	55.600	.0317	2.947	.5356	.723	.1502	.0997	.0238	4.111	
Top Brown	60.90	.086	5.30	.88	.95	.15	.24	.018	4.43	10.02
	54.6726	.07720	4.7600	.7918	.8546	.1350	.2160	.0162	3.9861	
Tubal	51.19	.060	4.45	.938	2.57	.165	.062	.016	4.18	13.46
	52.953	.0519	3.851	.8117	2.224	.1453	.0536	.0138	3.617	
Union*	60.54	.041	.....	.....	.....	.....	.....	.....	.....	8.11
	55.63	.0376	.....	.....	.....	.....	.....	.....	.....	
Wallace	64.550	.045	2.100	.370	.090	.180	.210	.008	2.800	9.700
	58.559	.040	1.890	.334	.812	.162	.189	.007	2.618	
Welsh	61.48	.055	3.35	.61	1.07	.47	.24	.016	3.79	11.43
	54.432	.0487	2.927	.540	.947	.416	.212	.0141	5.128	

VERMILLION RANGE.

ORE.	Iron	Phos.	Silica	Mang.	Alumina	Lime	Magnesia	Sulph'r	Loss by Ignition	Moist.
Chandler	64.43	.040	4.31	.10	4.99	.38	.20	Trace.	.98	4.00
	61.224	.0380	4.001	.095	1.801	.361	.190	Trace.	.931	
Jura	61.03	.078	4.31	.186	2.67	1.16	.....	.....	4.07	6.85
	56.779	.0725	4.010	.1451	2.484	1.079	.....	.....	3.787	
Long Lake	60.64	.043	7.68	.14	3.26	.40	.35	Trace.	1.43	6.40
	56.722	.0402	7.183	.130	3.049	.374	.327	Trace.	1.337	
Pioneer	63.11	.040	5.06	.139	2.55	.074	.017	.....	1.35	6.34
	59.108	.0374	5.301	.1226	2.388	.0693	.0159	.....	1.264	
Pilot	67.03	.032	2.25	.089	1.04	.031	.008	.....	.49	8.20
	65.555	.0312	2.160	.0674	1.017	.0498	.0078	.....	.479	
Red Lake	61.45	.122	6.73	.09	2.49	.61	.64	.019	.93	2.81
	59.723	.1185	6.540	.087	2.420	.592	.622	.0184	.903	
Savoy	63.76	.051	3.46	.080	2.38	.248	.....	.....	2.68	6.63
	59.532	.0476	3.230	.0746	2.222	.2315	.....	.....	2.502	
Sibley*	64.00	.048	4.00	.....	.....	.....	.....	.....	.....	6.00
	60.160	.0451	3.760	.....	.....	.....	.....	.....	.....	
Soudan	65.65	.084	4.05	.06	.85	.52	.29	.022	.56	1.29
	64.803	.0829	3.997	.059	.839	.513	.286	.0217	.335	
Vermilion	64.88	.136	4.24	.06	1.35	.65	.41	.015	.89	1.04
	64.205	.1345	4.195	.059	1.335	.643	.405	.0148	.883	
Vermilion Lump	66.05	.156	2.30	.09	1.06	.64	.42	Trace.	.51	.....
	65.600	.1549	2.284	.089	1.052	.635	.417	Trace.	.506	.66
Zenith	65.93	.036	3.30	.108	1.53	.075	.....	.....	.70	7.74
	60.845	.0332	3.044	.0996	1.4113	.0691	.....	.....	.645	

MICHIPICOTEN RANGE.

ORE.	Iron	Phos.	Silica	Mang.	Alumina	Lime	Magnesia	Sulph'r	Loss by Ignition	Moist.
Helen	58.24	.113	5.37	.13	.91	.13	.09	.063	9.09	.....
	56.89	.108	5.10	.12	.86	.12	.08	.0596	9.49	8.09

*Expected analysis for the season of 1902.

Amalgamated Scales Made in Advance.

For the first time since its organization the Amalgamated Association of Iron, Steel and Tin Workers went into convention this week with all its scales signed for another year. The convention opened on Tuesday at Wheeling, W. Va., with a large attendance of delegates. Prior to the convention agreements were entered into with the Republic Iron & Steel Co. and the American Steel Hoop Co. for a continuation of the present scale for the scale year terminating June 30, 1903. These agreements are similar to those entered into with the Amrican Tin Plate Co. and the American Sheet Steel Co. There is little likelihood that the convention will refuse to recognize the agreements entered into by its executive officers, and outside of a few changes in the foot notes the scales for the ensuing year may be said to be settled. The work of the scale committee of the association has been lessened by the signing of these scales and the chief duty of the delegates has already been accomplished. This means that the convention will be much shorter than usual.

Pittsburg Engineers and the Metric System.

The Metric System Committee of the Engineers' Society of Western Pennsylvania has sent out the following list of questions to members of the society relative to the bill now before Congress and the replies received will be read at a special meeting to be held on April 29.

1. In what line of work are you engaged?
(b) For what length of time have you been engaged in the present class of work?
(c) Please state your official position.
2. Is your use of a system of measures one of calculation or of practical measurements?
3. Have you ever used the metric system in either of the ways mentioned in No. 2 above? Please state which.
4. Irrespective of the inconvenience of making a change, which system of measurement, the present system or metric system, would you prefer? Why?
5. In your own line of work what amount of inconvenience and cost would be involved by the passage of the present bill?
(b) How much by its general adoption for all purposes?
6. Do you consider the advantages which would be secured by the adoption of the metric system sufficient to overcome the difficulties of making the change?
7. Considering the question generally and not limiting it to your own line of work, and allowing for your probable unfamiliarity with it, do you consider the metric system superior to the present system both for purposes of calculations and for purposes of practical use in measurements?
8. Is the inconvenience and cost of making the change from the English to the metric system your principal objection?
(b) If not, please state what you consider the greatest difficulty?
9. Do you consider it but a question of time until the general adoption of the metric system?
10. Have you any foreign business relations other than with Great Britain?
(b) If so, have you experienced any inconvenience in your dealings owing to your using the English system?
11. Does your use of a system of measures consist mostly in the use of measures of length, area, volume or mass?
12. Are you a graduate of a technical school?

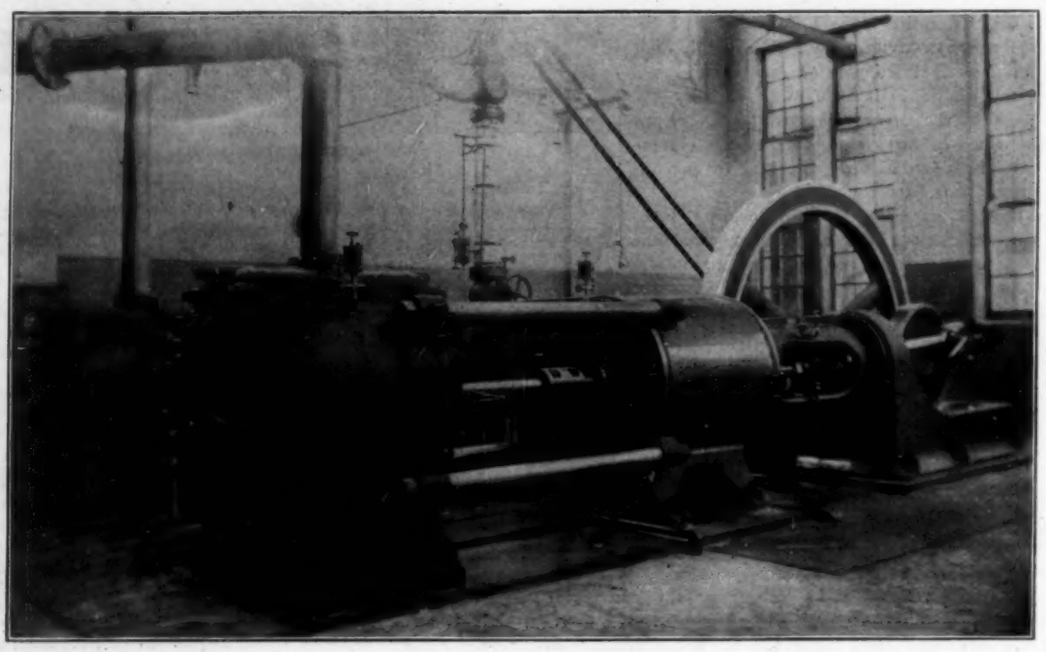
A permanent injunction was granted by the court last week enjoining the striking machinists at the plant of the Morgan Engineering Co., Alliance, O., from interfering in any way with the new men now employed in the plant. The temporary order was modified by the court when granting the permanent injunction, to the extent of permitting the striking machinists to persuade the present employes singly to leave the company s employ. The court's order permits no coercion or violence and the gathering of more than one striker for the purpose of persuading the present employes will be considered a violation of the injunction. Little trouble is now being experienced in the operation of the plant.

An injunction has been granted at Frederick, Md., to the Blue Mountain Iron & Steel Co., of Baltimore, to prevent the sale of its property at public auction. It consists of 7,000 acres of land and the Catoctin furnace. The plaintiffs declare their willingness to liquidate the mortgage now held against the property.

FRANKLIN AIR COMPRESSOR.

The accompanying illustration represents a Class D, s. c. air compressor having duplex steam cylinders and two-stage air cylinders, with inter-cooler, built by the Franklin Air Compressor Works of the Chicago Pneumatic Tool Co., installed in the Brooks plant of the American Locomotive Co., at Dunkirk, N. Y. This compressor has steam cylinders 20 inches diameter by 24-inch stroke, low pressure air cylinder 27 inches diameter by 24-inch stroke, and high pressure air cylinders 16½ inches diameter by 24-inch stroke, representing a piston displacement of 1,580 cubic feet of free air per minute at a working speed of 100 revolutions.

This is the first of this type of machine to be illustrated and described. It is noteworthy that it demonstrated under test one of the most efficient performances attained by a compressor of this type and capacity. Similar compressors have recently been installed at the shops of the New York Central & Hudson River Railroad Co., at Depew, N. Y.; Lake Shore & Michigan Southern Railway Co., at Collinwood, O.; New York, New Haven & Hartford Railway Co., at New Haven, Conn.; Delaware, Lackawanna & Western Railroad Co., at Kingsland, N. J.; Terre Haute & Indianapolis Railroad Co., at Terre Haute, Ind.; Norfolk & Western Railroad Co., at Roanoke, Va.; Erie Basin Dry Dock Co., Brooklyn, N. Y.; United States Navy Yard, Boston, Mass. (three machines). The manufacturers build this type of compressor in a number of sizes, and also duplex and single types, both steam driven and belt actuated.



FRANKLIN AIR COMPRESSOR, CLASS D.

New Steel Works Records at South Chicago.

The South Works of the Illinois Steel Co., at South Chicago, made some unusual records in March, those in the Bessemer and rail mills being the best average for 52 turns yet reported. The blast furnaces produced 102,351 tons, and the Bessemer plant 80,481 tons, an average per turn of 52 turns of 1,547 tons. The best previous record in Bessemer steel was 78,783 tons, with an average per turn of 54 turns, 1,459 tons. The rail mill produced in March 64,178 tons, with an average per turn of 52 turns of 1,234 tons. The best previous record in the rail mill was 63,253 tons, with an average per turn of 52 turns of 1,216 tons. For the week ending March 1, 1902, one rail mill produced 16,323 tons in 12 turns of 12 hours, an average of 1,360 tons per turn.

The Rollins Engine Co., Nashua, N. H., will extend its main building 65 feet. A large amount of machinery will also be added to the machine shop.

THE USE OF ELECTRIC MOTORS AT BLAST FURNACES AND ROLLING MILLS.

At the monthly meeting of the Engineers' Society of Western Pennsylvania held at Pittsburg, on Tuesday evening, April 15, a number of interesting papers were read on the use of the electric motor in industrial establishments. S. S. Wales, superintendent of the electrical department of the Homestead Steel Works, read a paper entitled "The Electric Motor in Mill Work," and "The Use of the Electric Motor in Modern Blast Furnace Plants" was covered by Superintendent A. E. Maccoun of the electric department of the Edgar Thomson Steel Works. E. P. Van Kirk, electrician at the Westinghouse Air Brake Co., read a paper on the electric plant of the Westinghouse Air Brake Co. while some characteristics of the direct current motor were exploited by N. W. Storer, electrical designer of the Westinghouse Electric and Manufacturing Co. F. B. Duncan, employed as a designer at the plant of the Akron Electrical Mfg. Co., Akron, O., presented some valuable data on power consumption in connection with machine tool drives.

Electric Motors at Blast Furnaces.

The paper presented by Andrew Ellicott Maccoun on "The Use of the Electric Motor in Modern Blast Furnace Plants" follows:

In the large blast furnace plants of today electricity is gradually taking a very important part in the economical operation of all labor saving devices for handling raw materials, such as ore, coke and limestone. This is largely due to the great convenience and economy in transmitting it, the ease and convenience of control and the great economy over uneconomical steam engines which is effected by its use. Most of the power houses for these plants have their steam boilers supplied by the waste blast furnace gases, no additional fuel being required; the bosh water which is circulated around the tuyeres and cooling plates of the furnaces can be used as condensing water, so that power can be generated very economically as the power plants for this purpose generally use compound condensing engines of good steam economy.

Large electric ore bridges are used in the stock yards of these furnaces for handling all the raw materials, and these operate in the cheapest possible way, unloading and storing it in the stock yards so that large supplies of all the different grades of ore can be kept on hand. As the furnaces require the different ores, grab buckets on the bridges take it from the piles and dump it in the ore bins ready for use in the furnaces. Electric car dumpers also are being used extensively for dumping the railroad cars in which the ore and other raw materials are received into smaller cars more suit-

able for being unloaded from the ore bridges into the stock yards; electric locomotives are used for shifting these cars, and in many places they are also used for shifting the railroad cars in which the ore, coke and limestone are received, over the bunkers for direct use on the furnaces. These electric locomotives are much more economical than the steam shifting locomotive, and much fewer repairs are required on them. Small electric cars or larries are also used extensively for delivering the raw materials from the ore, coke and limestone bunkers directly to the furnace skips. The labor for handling these raw materials has been reduced to such an extent by these labor saving devices, that it is surprising to see how few men are required in the stock yards of the modern furnace plants where such enormous quantities of raw material are continually being handled.

There are many other places around blast furnaces where the use of electric motors also plays a very important part, such as on metal mixers, in the running of machine shops and carpenter shops, tilting of hot metal ladles, and running of electric cranes for handling pig iron, on cranes for skulling ladles, and on skull-crackers for breaking up scrap. For work of this character the electric motor gives by far the most satisfactory results, and there are many places where their application has reduced the labor force required to a quarter of what it formerly was when the steam engine was used, and the investment has paid for itself in less than a year.

Motors are also used to advantage in running pig machines; these consist of endless conveyors with molds in the shape of an iron pig, into which the molten iron is poured and cast into pigs which fall from the conveyor into cars ready for shipment; these machines have saved much hard labor around blast furnaces which formerly required large cast-houses attached to them in which the iron could be run into molds, but now it is run from the furnace directly into ladles, and if it is not to be converted directly into steel it is poured on the pig machine and cast into iron pigs.

In all work of this class scattered over large areas the electric motor is by far the most economical thing to use; outside of its gain in economy over the steam engine, the condensation in long steam lines is avoided and often small boiler plants have been done away with, and labor, fuel and repairs have been saved. And as the electric motor requires very little attention it can be readily seen what enormous savings are effected by its use in such places. Electric hoists are also gradually coming into use for hoisting the raw material to large furnaces; these with the modern skip equipments save top fillers on the furnaces and also are much more economical than the steam engine used for this purpose.

I will mention a few of the advantages gained by the use of electric hoists and will make a few comparisons between the hoists operated by steam and by electricity.

The modern skip equipments are made very much larger than the old style hoists, lifting from 5 to 10 tons of raw material at from 250 to 400 feet per minute; with large furnaces this is very important, for at times when a furnace is running badly it is very important to fill it quickly, thus not allowing the burden to get very far out of reach; but with the older style elevator which took up two barrows or so at a time, it took a long time to fill a furnace in this condition, and furnaces always work much better when such irregularities are avoided.

The steam hoisting engines used for this purpose are very uneconomical, using about 150 pounds of steam per horsepower hour. Automatic cut-off engines have been tried repeatedly in many places, but in all cases that I know of they have been failures, and were replaced by the old style engines, as the automatic cut-off engines would not make the exact stops required for this class of work.

The electric hoist can be made to stop at exactly the same point in its travel, independent of the load carried. This is done by the means of series of magnets that control switches arranged to cut in more resistance when the motor starts to slow down near the end of its travel, on the light loads than on the heavy loads. By adjusting these magnets, the hoist can be made to stop at any point, independent of the load carried.

In addition to the great steam consumption of the steam hoist, there is a far greater loss due to the condensation going on in the long steam lines that generally run to these hoists, and in the exposed valve chests of the engines. These losses in twenty-four hours amount to considerable, and there are always more or less leaks in steam lines of this character; besides this there are often long intervals during which the engines stand idle, yet all these losses are continually going on. There is also a great quantity of cylinder oil, and engine oil, and packing continually being used by the steam hoist. These items amount to a great deal during a year, but with the electric hoist the bearings are self-oiling and use very little oil, and require very little attention. At some works where these hoists are used, the man that runs the hoist also weighs the ore and limestone, and operates the bells on the furnace, the hoist being entirely automatic after it is once started.

From actual tests on one of these furnaces, the average efficiency (the ratio between the theoretical mechanical horsepower required to lift the material and the electrical horsepower taken by the motor), is approximately 61 per cent, when the efficiency is averaged with all the different loads, such as ore, coke and limestone. This efficiency takes into account all the losses in motor and gearing, friction of skips on tracks, and is the average of a great number of readings taken from all the different loads.

An additional test was also made from watt-meter readings, the watt-meter being very carefully calibrated.

The watt-meter readings were taken for two weeks on a line on which there were three blast furnaces; two of the above furnaces were identical in size, the third was smaller. Forty-eight horsepower was the average power consumed by these three furnaces during this period. Eleven horsepower was the part of this power estimated as used by the small furnace. Eighteen and five-tenths horsepower was the power consumed by each of the larger furnaces.

Ten thousand tons of raw material was the approximate amount lifted to each of the larger furnaces each week during this period, and 135 feet was the height material was lifted. Nine and one-tenth horsepower was the average theoretical horsepower required to lift this material to one of the larger furnaces during this time.

Fifty per cent is the approximate efficiency or ratio between the power used at switchboard in power house, as shown by the watt-meter and the theoretical horsepower required. This takes into account all losses in lines, motors, gearing, friction of ropes, drums, sheaves and extra trips when no load is carried, and movements made for lifting scrap. If an electrical horsepower hour is generated at switchboard in power house for 20 pounds of steam, then taking all losses into consideration it takes 40 pounds of steam per horsepower hour to do the actual lifting at the hoist. The steam hoisting engines take over 150 pounds of steam per horsepower hour, and this does not include any losses such as friction, condensation in steam pipes and valve chests, and it can be readily seen how great losses these are when they are properly considered.

If the value of an electrical horsepower for a year at switchboard is placed at $50, the cost of power of one year at one of the larger furnaces would be approximately $925; at this rate, therefore, the cost of power for lifting 100 tons of material 135 feet would be $17^{5}/_{10}$ cents, and the cost of lifting one ton of material the same height would be one-sixth of a cent. There are very few steam hoists at blast furnace plants that will do this work for one cent per ton.

This shows plainly in one instance the great economy effected by the use of the electric motor on furnace hoists, and this is only one of the smallest savings, because as a usual thing in other classes of work there are great savings in labor besides the savings in power, and at times one man can be put to manipulate the same number of motors where formerly it took two or three men when engines were used. These facts show how the use of electricity is being developed about steel works and blast furnaces, and there are many of these works that have over 10,000 horsepower of motors of various sizes for work of this kind, and there are gradually increasing applications of electricity to many other classes of work.

The Electric Motor in Rolling Mills.

Mr. S. S. Wales then read the following paper on "The Electric Motor in Rolling Mill Work:"

It is not quite ten years since the first systematic attempt was made to utilize the electric motor in rolling mill work, yet it has almost entirely superseded the small hoisting engine

in many places, and has rendered some classes of work possible which if accomplished by steam would require an outfit so cumbersome as to be almost prohibitory. One of the most notable applications of electric motors, and one which has been revolutionary in mill work, is the overhead traveling crane which is used over stock track for handling raw material, pouring steel, for handling ingots to and from the heating pits and for sorting and loading cars for shipment. To do without this crane would be a hardship, and to replace the motor by steam engine, rope drive or square shaft would be almost out of the question.

The next in importance and in reality a brother of the crane is the horizontal charging machine which is used in charging open-hearth furnaces, and in handling large slabs and blooms to and from the horizontal heating furnaces. Another large field of application is on the roller-table, which is such a typical piece of machinery in mill work. Here the adaptability of the motor depends not so much on its lightness as on the absence of long steam pipes which act as condensers, and the complication of reversing levers. The screws on bloom, slab and plate mills are now largely driven by motors, and in up-to-date boiler plants, using mechanical stokers, the coal is carried to storage by motor-driven conveyors, from these delivered to boilers by motor-driven coal-handling machines and finally the ashes are loaded into cars by small motor-driven ship-hoists.

So it will be seen that at this time electric power has edged its way into all branches of the steel business. As an example let us look at the latest steel-producing and roll plants of the Carnegie Steel Co. The steel scrap, in broad gauge cars, is placed within reach of five-ton electric stock cranes which handle the material into charging boxes and place them on narrow gauge cars. These are taken to the furnaces and the material charged by electric charging machines and the required amount of iron is charged, in the molten form, by overhead ladle cranes. The finished steel is carried by large overhead ladle cranes to the pouring platforms where it is tapped into the ingot molds. After being stripped the ingots will go, let us say, to the slabbing mill where they will be charged in the heating pits by vertical electric charging cranes, and are carried by them to the rolls where heated. It now passes through the rolls which are adjusted by electric-driven screws, and from there through the shears, the slabs being handled by electric crane. They now go to the plate mill where they are charged and drawn by horizontal electric charging machines and delivered by electric-driven roller-tables to the mill rolls which are adjusted by motor-driven screws. From the rolls the plate is carried by motor-driven tables to the cooling and straightening beds, and after being sheared to size is loaded for shipment by overhead electric cranes. All this sounds very smooth and quiet, but it is in reality attended with a certain amount of trouble and delay caused by rough usage of machinery, too small motors, chronic neglect to oil, or a roller bearing so tight as to form a brake and occasionally a key-way in the line shaft babbitted into a bearing during Sunday repairs. All the things a motor will do, or can be subjected to without material damage, and why, are for the future to decide.

I have seen motors do good work surrounded by the most ideal conditions, and I have also seen them give endless trouble in apparently the same conditions. I have seen motors work under conditions which were diametrically opposed to the theory of their construction and operation. I have today two 50-h. p., four 5-h. p. and two 3½-h. p. series motors, which are brought to a stop by being driven against ingots, and although they have no other protection than a controller, which is operated by hand, they give little trouble and are seldom if ever burnt out.

The electric motor is the most conscientious machine ever designed. This trait alone has laid it open to much abuse, with the result that many of the effects of overwork have been charged against it as constitutional defects. A motor is constructed with the intention that the armature shall turn, and if properly connected, turn it will or wreck itself in the attempt. Granting that it can turn with the load it is given to carry it will continue to do the best it can until almost burned up. The fact that a motor will run even with an injurious overload, coupled with a general misconception of the meaning of the manufacturer's rating has resulted in the general application of motors much too small for their work, and this, too, by engineers who would never think of falling into the same error with the steam engine. Further, firms which build motor-driven machinery, on account of close competition almost uniformly underestimate the size of motor required for the work, although their calculations of actual power required may be perfectly correct. The motor specified will certainly do the work at the acceptance test of the machine but may break down in less than two weeks of factory operation, by which time the machine is probably paid for and it lies entirely with the purchaser to keep up the constant repairs required, or to make such changes as are necessary to adapt the next larger size motor to the machine. Wherever this state of affairs exists the latter course should be followed if possible, as the constant replacing of burnt-out armatures and fields soon eats up the cost of the larger machine, in addition to loss in time and unreliable service. The surest way to avoid this difficulty in most cases is for the electrical engineer in charge of the work to specify the type and minimum capacity of each motor that he will accept, thus freeing this vital part of the machine from the competitive reduction in size to which it would otherwise be subjected.

Motors for mill use may be of any or every type built, but in any case it is probable that no single type would cover the ground satisfactorily under all conditions. All have their able advocates whose reasoning is very convincing to others, and perfectly satisfactory to themselves. At the present time no motor has had such diversified application in this line as the standard street railway series motor; its claim for recognition being the powerful starting effort, its complete mechanical protection from external damage, and the fact that it is a standard article turned out in large numbers from the electric companies and therefore can be obtained on short notice. Its drawbacks are its high speed at very light loads and its lack of ventilation. The writer is inclined to favor this type for a large proportion of mill work, though not averse to the open type series, shunt or compound-wound motor, for driving certain classes of machinery for which they are especially well fitted. The open type has the advantage of easy access for inspection or cleaning, but it offers no protection from foreign substances, small pieces of iron, crowbars, etc., which are very likely to come within its field of attraction during ordinary mill operation.

In the earlier days of electric power development a great deal of reluctance was shown by the manufacturers of electrical apparatus in regard to giving detail of performance of their motors to the prospective user. This led to series motors being applied to work at their nominal rating as to output and speed, which would uniformly result in overload, or if the attempt was made to reduce the load by increasing the size of motors, the speed of operation would be much higher than the figures showed. At the present time there is no difficulty in obtaining complete characteristics of any standard motor on the market, so that sizes can be specified and results predicted with a fair degree of certainty.

I will endeavor to show some easy methods of determining the proper size of motor for such work as is ordinarily met with in mill use, such cranes and tables, not claiming absolute accuracy, but feeling that by following along these lines the user will be on the safe side, although he will often be told he has figured too high. As in a general crane specification the actual weights of material and gear reduction, etc., are not known, some arbitrary assumptions will have to be made and some empirical formula will be used, but as both are founded on facts and experience some reliance may be placed in them.

An electric crane is divided into three general parts—bridge, trolley and hoist, each of which has its own motor and controlling system, and each subjected to different conditions of work. For the bridge where the ratio of axle bearings to diameter of wheel is between one to five and one to six, the following table will answer our purpose for weights and traction for different spans:

Let L=working load of crane in tons.
W=weight of bridge alone in tons.
w=weight of trolley alone in tons.
S=speed in feet per minute.
P=pounds per ton required.

Span	W.	P.
25 ft.	.3L	30 lbs.
50 ft.	.5L	35 lbs.
75 ft.	1. L	40 lbs.
100 ft.	1. 5L	45 lbs.

For the trolley we would assume the weight and traction as shown in the following table:

L.	P.	W.
1 to 25 tons.	.3L	30 lbs.
25 " 75 "	.4L	85 lbs.
75 " 150 "	.5L	40 lbs.

Now the power required for the bridge will be

$$\frac{(L + W + w) \times P \times S}{33,000} = H. P.$$

which result will be used in connection with the motor characteristic to determine the gear reduction from motor to track wheel. As the nominal h. p. rating of a series motor is based on an hour's run with a rise of 75 degrees C. above the surrounding air and as conditions of bad track, bad bearings or poor alignment of track wheels may be met with—in factory operation 1½ times the above result should be taken as the proper size motor for the bridge.

For the trolley the power required would be—

$$\frac{(L + W) \times P \times S}{33,000} = H. P.$$

which will be used for speed and gear reductions, but 1¼ times this should be used for size of motor.

For hoist work we cannot have so large margin of power, as the variation from full load to no load may imply a possible dangerous increase of speed, and unless the crane is to be subjected to its maximum load continuously or is to be worked where the temperature of the surrounding air will be high, it is safe to use the size by assuming 1-h. p. per 10 feet ton per minute of hoisting. This is nearly equal to assuming the useful work done as 60 per cent of the power consumed.

As an illustration, let us take a crane of 50-ton capacity lifting speed of hoist 15 feet per minute. Bridge to be 70 feet span and to run 200 feet per minute with load. Trolley to travel 100 feet per minute with full load. On the foregoing assumption the bridge would weigh 50 tons and require 40 pounds per ton for traction, and the trolley would weigh 20 tons, and require 35 pounds per ton for traction. The power for the bridge would be

$$\frac{120 \times 40 \times 200}{33,000} = 29 \text{ H. P.}$$

and the size motor 1½ times this would give 43½-h. p. or 50-h. p. this being the nearest standard size, and the specification should read not less than 50-h. p. motor to be used for bridge travel.

Assuming Westinghouse motors to be used, as they are more commonly known in this district, this would call for a No. 38 50-h. p. railway motor. By referring to characteristic sheet for this type we find that at 29-h. p. this armature will run 612 r. p. m., which, when the diameter of the track wheel is known, will give the gear reduction needed. Similarly the trolley will require

$$\frac{70 \times 35 \times 100}{33,000} = 7.43 \text{ H. P.}$$

and the size motor required will be 1¼ times this, or 8.28-h. p. or 10-h. p. Dust proof as the next standard size and the specification would read not less than a 10-h. p. motor to be used. The characteristic of a Westinghouse 10-h. p. motor shows that the armature will run 8.20 r. p. m. at 7.43-h. p. The hoist would require $50 \times 15 \div 10 = 75$-h. p. and would be specified not less than 75-h. p. motor to be used on the hoist. The next standard size Westinghouse motor suitable for crane service is the No. 76 rated at 80-h. p. at 220 volts and the armature speed at 75-h. p. is shown on the characteristic to be 460 r. p. m. The required power will of course be modified by the requirements of special cases, the use of rope or chain, whether the reduction is made mostly in the chain or in the gearing, etc., but still they will give reliable results to the user.

The power required by roller-tables in mill work varies greatly as they are subjected to the "tight bearings" and lack of oil to a greater extent than electric cranes, and as there will be from 2½ to 3 bearings to each table, these chances for trouble are greatly multiplied. For the average conditions of mill tables where each roller is driven by a miter gear from a common line shaft and with usual mill lubrication, the following empirical formula derived from the test of twenty tables represents about the power required:

$$\frac{W \times D \times S \times N}{950,000} = H. P.$$

Where W = weight of roller in pounds the load to be carried on table being considered as uniformly distributed over all rollers 1—N to each. D = dia. of bearings. S = speed of table in r. p. m. of rollers. N = number of rollers in table.

The same 1½ times power required for size of motors should be taken as for crane bridges. This takes no account of diameter of roller used, which would of course have some effect on the power required to move the load to be handled and would also show some flywheel effect when starting, but still it will check fairly well with tables now in use under existing conditions, two examples of which are given here: N = 18. W = 1,600 pounds. D = 4½ pounds. S = 200 r. p. m. Diameter of roller 10 inches:

$$\frac{1600 \times 4\frac{1}{2} \times 200 \times 18}{950,000} = 27.2 \text{ H. P.}$$

From actual test under working conditions this table required 28.8-h. p. or the nearest Westinghouse motor being No. 38 of 50-h. p., this type should be used. The characteristic of the No. 38 at 27.2-h. p. shows an armature speed of 632 r. p. m., which would show a reduction of about 3.2 to 1 from armature to roller. As a matter of fact this table is equipped with a 30-h. p. motor and is the source of continual annoyance from overload.

In the second example, N = 16. W = 1,000 pounds. D = 3 pounds. S = 110 r. p. m.:

$$\frac{1,000 \times 3 \times 115 \times 16}{950,000} = 5.8 \text{ H. P.}$$

By actual test 5.5-h. p. was required, as mill operators become more familiar with the proper handling of motors, and engineers become more liberal in specifying sizes, the electric motor is destined to fill a still larger field in mill work than is even now thought of.

PERSONAL.

Victor Beutner has severed his connection with Julian Kennedy, of Pittsburg, to become consulting engineer for Spang, Chalfant & Co.

Reuben Miller, of Pittsburg, chairman of the executive committee and treasurer of the Crucible Steel Co. of America, has tendered his resignation and will retire from active participation in the affairs of the company on May 1. Mr. Miller's action is due entirely to ill health. The chairmanship of the executive committee being largely an honorary position will probably be abolished. Julius Bieler, assistant treasurer, will succeed Mr. Miller as treasurer and John Neeley will succeed Mr. Bieler. Owing to Mr. Miller's retirement, additional responsibilities will fall on the shoulders of President C. H. Halcomb and the latter has retired as president of the subsidiary St. Clair Steel and St. Clair Furnace companies. W. P. Snyder, director in the company and senior member of the firm of W. P. Snyder & Co., long connected with blast furnace and steel works operations, was elected to succeed Mr. Halcomb as president of the two allied companies.

Jacob Shook, for 35 years chief engineer at the Jones & Laughlins South Side mills, Pittsburg, resigned last week. He was agreeably surprised by the engineers of the works at his home and in addition to a number of handsome presents received the cash covering the expenses of a trip to the Pacific coast.

C. Clark and T. Green, manufacturers of steel springs of Rotherham, Eng., were in Pittsburg last week.

Glenn R. McClintock, assistant superintendent of the yards of the Illinois Steel Co., Joliet, Ill., has resigned to accept the position of superintendent of all the yards of the Crucible Steel Co. of America, of Pittsburg.

E. O. Hopkins, president of the Sloss-Sheffield Steel & Iron Co., announces that he will retire on May 1. Friction with other officials of the company is given as the reason. He says that during his incumbency he has rebuilt five of the seven furnaces of the company and that there are now orders on its books for 188,000 tons of iron for delivery this year. J. C. Maben, of New York, chairman of the board of directors, will succeed Mr. Hopkins.

J. W. Duntley, president of the Chicago Pneumatic Tool Co., Chicago, sailed for Europe April 1, on a brief business trip.

Warner Shook, who for several years has been superintendent of the Alice furnaces of the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., has been appointed superin-

tendent of the Ensley furnaces to succeed A. P. McClure, who has been acting superintendent since the resignation of J. J. Shannon.

E. C. Crowther, who has been manager of the Minerva furnace at South Milwaukee, Wis., for some months, takes charge of the furnaces of the Columbus Iron & Steel Co., Columbus, O., this week.

W. H. Moulton, secretary of the industrial committee of the Cleveland Chamber of Commerce, who has done a most creditable work in a unique position, in the past two years, has resigned this position to become assistant manager of the Osborn Mfg. Co., of Cleveland. This company, which is a large manufacturer of brushes, brooms and foundry supplies, is about to move into its own extensive plant in the center of the manufacturing district of Cleveland, on Hamilton street. Mr. Moulton is a graduate of the Worcester Polytechnic Institute and has had a large experience in manufacturing lines.

Ambrose Beard, who has been division superintendent of the American Sheet Steel Co., at Muncie, Ind., has been promoted to the district embracing the Reeves works, Canal Dover, O., and also the works at New Philadelphia, Dennison, Dresden and Canton, O. He will continue to act in an advisory capacity for the Midland works and the Piqua, O., works.

P. M. Boyd, secretary, has also been elected treasurer of the Lorain Steel Co., Lorain, O., succeeding A. C. Gary, who goes to Chicago as credit manager of the Illinois Steel Co.

On May 1, Edwin N. Ohl will become connected officially with the well known firm of J. W. Rhodes & Co., of Pittsburg. Mr. Ohl is secretary and general manager of the Atlantic Iron & Steel Co., of New Castle, Pa., and a member of the board of directors of the Republic Iron & Steel Co. He is also general manager of the Connellsville Coke Co., a subsidiary company.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of their Wants:—

The Double Truss Cornice Brake Co., of Buffalo, N. Y., has been incorporated at Buffalo, N. Y., with $75,000 capital, of which $60,000 has been paid in, and will erect a plant for the manufacture of machinery tools and patented articles. J. H. and C. J. Crocker, of Buffalo; T. and C. Halsted, of Syracuse, and J. A. Halsted, of Mt. Forest, Ont., are the incorporators.

At New Castle, Ind., a bridge and structural fitting concern has been incorporated with $10,000 capital. A structural fitting shop will be erected immediately. T. J. Burk, C. W. Mouch, H. E. Jennings, W. F. Byrket, H. Boor, R. Wisehart and H. Yauky are the incorporators.

The E. A. Bryan Co., of Chicago, Ill., has been incorporated with $25,000 capital to manufacture steel storage tanks. E. A. Bryan, E. B. Smith and N. A. Street are the incorporators.

A. H. Green, manager of the Detroit, Mich., Solvay Process Co. plant and one of the promoters of the new furnace company that will erect a furnace on Zug Island, near Detroit, reports that the stock has been largely oversubscribed. The company will be capitalized at $750,000.

The Illinois Forging & Manufacturing Co., of Chicago, has been incorporated with $25,000 capital. The company will erect a plant for the manufacture of forgings and machinery. W. Garfield, H. H. Reed and J. H. Geweke are the incorporators.

The J. Thompson & Sons Manufacturing Co., of South Beloit, Ill., has been incorporated with $300,000 capital to manufacture machinery, tools and implements. G. H. Peaks, B. F. Manley and F. T. Murray are the incorporators.

The Chattanooga Bridge Co., of Chattanooga, Tenn., has been incorporated with $10,000 capital. W. M. Hewitt, G. C. Steward, W. O. Burks, A. R. McKenzie and G. E. Mattice are the incorporators.

At Minneapolis, Minn., a consolidation of the Twin City Iron Works, the Minneapolis Malleable Iron Co. and the Barnett & Record Co. has been effected. The company has been capitalized at $300,000 of which $250,000 has been paid in. The old plant of the Minneapolis Harvester Co. at South Minneapolis has been purchased and the three plants will be consolidated in this one large plant. The new company will manufacture stationary engines, machinery, and will do a general foundry business. J. L. Record will be made president and general manager and O. P. Briggs will be placed in charge of the engine and machinery departments. A name for the new company has not yet been decided upon.

The J. K. Tomlinson Mfg. Co. has been granted a New Jersey charter with a capitalization of $40,000. The new company will manufacture water heaters. J. K. Tomlinson, Pickway, W. Va., and George R. Allison, of New York, are the incorporators.

The National Engine Co., of Rockford, Ill., has been incorporated with $65,000 capital to manufacture machinery and gasoline engines. L. Faust, T. Leon, D. I. Tassandier and J. A. Landstrom are the incorporators.

The United States Chain Co., of Greenfield, Ind., has been incorporated with $30,000 capital to manufacture chains, drop forgings and saddlery hardware. J. A. Wells, W. J. S. Woodall, O. A. Wells, W. M. Wells and S. R. Wells are the incorporators.

The Haller Machine Co., of Chicago, Ill., has been incorporated with $10,000 capital to manufacture machinery and mechanical devices. C. Haller, William Golltz and G. M. Mayer are the incorporators.

The Cochran Co., of Lorain, O., manufacturer of refrigerating machinery, has taken over the business of the Brown Gas Engine Co., of Columbus, O. The two lines of manufacture will be continued under a new company to be known as the Brown-Cochran Co., with headquarters at Lorain. A new plant will be erected at South Lorain, the main building of which will be 60x170 feet. The company is capitalized at $225,000.

The National Boiler Co., of Indianapolis, Ind., has been incorporated with a capital stock of $50,000. The directors are: Oliver M. Summons, Alonzo J. Summons, James H. Matthews, Clay Laremore and Anthony Stonehouse.

The Deady Furnace Co., of Houston, Tex., has been incorporated. Capital stock, $10,000. The incorporators are J. C. Bering, H. W. Cortes, J. H. Schumacher and J. S. Deady.

The Tidewater Stove Co., New York, has been incorporated at Albany, N. Y., capital, $500,000. Directors: Herman Dowd, W. J. Roberts and T. D. Jordan, New York.

George C. Lunt has purchased a lot of machinery and other equipment from the A. F. Towle & Son Co., Greenfield, Mass. He will carry on business in the Towle factory and manufacture some of their line of goods, adding new designs as rapidly as possible.

The Tin Plate Bearing & Supply Co. has been organized in Jersey City, N. J., to manufacture railroad equipment. The application for charter specifies a capital stock of $1,000,000, of which $300,000 is preferred stock at 7 per cent. The incorporators are: Louis B. Dailey, of Orange, and Kenneth McLaren and F. O. Coughlin.

The Century Stove & Mfg. Co. has been organized at Johnstown, Pa., with a capital stock of $100,000. The new company will be ready for business by May 15. The Johnstown directors are John H. Waters and Samuel B. Waters, of the Fowler Radiator Co. The other directors are Rowland S. Wilson and Robert Monroe, of the Reineke-Wilson Co., of Pittsburg, and Edrick C. Warren, late of Cleveland, O., where he was manager of the Dangler Stove & Mfg. Co. Mr. Wilson will be elected president and John H. Waters secretary and treasurer.

The United States Tube Co., of Buffalo, N. Y., has been incorporated with a capital of $1,000,000, to manufacture metal tubes, flues, pipe and other metallic articles. Of the capital stock $200,000 is preferred and $800,000 common. The directors are H. K. Flagler, C. H. Twist, H. C. Diehl, of Buffalo; A. W. Thomson, of Cleveland; G. W. Dickinson ,of New York; G. E. Royce, of Rutland, and O. S. French of Fremont, O. The plant of the company started up some time ago.

Thomas J. Drummond and Edgar M. McDougall have formed a partnership at Montreal, Canada, to do business as the Canadian Iron & Foundry Co.

The addition to the Le Count machine shop at Norwalk, Conn., has been completed and will be equipped with new machinery at once.

The Keystone Railway Supply Co. has been granted a New

Jersey charter with $100,000 capital. The company will erect a plant for the manufacture of railway supplies. Thomas L. McKean, of Easton, Pa.; E. P. Burritt, of Westfield, N. J., and W. G. Marshall, of Flemington, N. J., are the incorporators.

The St. John Foundry Co., Ltd., of St. John, N. B., has been incorporated with $6,000 capital. J. E. Wilson, R. Maxwell, R. Rachford, James Keenan, Charles Cobban, E. McLaughlin and C. Rachford are the incorporators.

Liebbe, Nourse & Rasmussen, Des Moines, Ia., have just completed plans for their new two-story factory building. The building will be built of brick, 100 feet long and 44 feet wide. The firm is now in the market for machinery for the manufacture of cornices, steel ceilings and stamped metal work.

The Turbine Pump Co. has been granted a New Jersey charter with $50,000 capital to manufacture pumps and machinery. W. C. Brown, D. Hills, John Richards and A. C. Wall are the incorporators.

William Liebig, Charles Manzelman, C. J. Draske and J. C. Petz, of Detroit, Mich., have formed a limited partnership to be known as William Liebig & Co., for the purpose of manufacturing, repairing and selling machinery.

The National Bridge Co., of Indianapolis, Ind., has been incorporated with $20,000 capital for the purpose of engaging in bridge building and doing general steel construction work. D. B. Luten, G. H. Marsteller and E. H. Luten are the incorporators.

The E. A. Bryan Co., Chicago, has been incorporated with a capital stock of $25,000. The company will manufacture steel storage tanks. The incorporators are E. A. Bryan, Edwin Burritt Smith and Norman A. Street.

The South Texas Iron Works, Houston, Texas, has been incorporated with a capital stock of $30,000. The incorporators are Robert Storm, J. W. Snyder, J. L. Williams and others.

The firm of John A. Waters & Co., Richmond, Va., will be incorporated with a capital stock of $30,000. The company will enlarge its business by establishing a plant at Manchester for the manufacture of locomotives, cars and machinery.

C. W. Deming, Brunswick, Ga., is in the market for a 50-h. p. second-hand engine.

The Soule Steam Feed Works, Meridian, Miss., is in the market for second-hand machinery, as follows: iron planer, radial drill, shaper and keyseating machine.

The J. Thompson & Sons Co., formerly of Beloit, Wis., have been incorporated in Illinois, to manufacture machinery, tools and implements, with a capital stock of $300,000. The company recently built a new plant at South Beloit, this town being just across the state line in Illinois. The incorporators are George H. Drake, Benjamin F. Manley and Frank T. Murray.

The Enterprise Stove and Sheet Metal Mfg. Co., Quincy, Ill., has been incorporated with a capital stock of $65,000. The incorporators are Harry E. Baker, Frank Seger and Henry C. Baker.

The Haller Machine Co., Chicago, has been incorporated with a capital stock of $10,000. The incorporators are Carl Haller, William Goltz and George M. Mayer.

The National Engine Co., Rockford, Ill., has been incorporated with a capital stock of $65,000 to manufacture machinery and gasoline engines. The incorporators are Levin Faust, T. Leon, J. A. Landstrom and others.

The Southern Car Mfg. & Supply Co., Beaumont, Texas, which has been incorporated with a capital stock of $150,000, will proceed at once to erect a plant for the manufacture of cars, irrigation machinery, rice-mill equipment, boilers, etc. The machine shop will be 80x160, and the foundry, 60x100. The following officers have been elected: J. C. Wiggs, Jr., of St. Louis, president; and W. W. Wilson, vice president.

The Alexandria Iron Works, Alexandria, Va., has been incorporated with a capital stock of $30,000. The company will enlarge and operate the works previously owned by Thomas Jamieson & Co. The incorporators are C. C. Butts, A. D. Brockett and C. E. Butts.

The Mutual Machine Co., Washington, N. C., has been incorporated with a capital stock of $25,000.

John D. Dwyer, Birmingham, Ala., has succeeded in getting subscriptions amounting to $250,000 for the establishment of a rolling mill in that city.

The C. A. Treat Mfg. Co., of Hannibal, Mo., has purchased property adjoining its plant for the purpose of erecting an extensive addition to its foundry. The output of car wheels will be practically doubled when the extension is completed.

United Telpherage Co., 20 Broad street, New York, would like to correspond with steel foundries relative to the purchase of steel castings up to 50 pounds, in large quantities.

The stove plant at South Pittsburg, Tenn., has passed into the hands of Memphis capitalists, and C. C. Huntington, formerly manager of the Wetter plant, is in charge of the property, which is now under the name of the American Stove & Foundry Co.

The H. Adler Mfg. Co., of Pittsburg, Pa., has bought the building erected for the Speer plow works at West Carnegie, and intends to improve it and put in a plant for the manufacture of gas stoves, ranges and other gas appliances.

The Central Iron Works, Quincy, Ill., are in the market for a 48-inch by 8-foot planer.

The plant owned by the National Machinery Co., of Tiffin, O., has been sold to the National Machinery Co., of Trenton, N. J., for the sum of $750,000. It is understood that the plant will be greatly enlarged. The new directors are Lewis Selle, A. Betts, Augusta Rohn, George E. Schroth, Tiffin; M. Frost, Earl R. Frost, Toledo; Francis B. Lee, Trenton; Eugene J. Barney, H. N. Reynolds, Dayton. The officers are: President, Lewis Selle; vice president, H. N. Reynolds; treasurer, W. Betts.

Fremont C. Randall and Oscar Athon will open a machine shop in the Lowell building, Janesville, Wis., and are purchasing equipment.

The recent meeting of the National Compositype Co., of Baltimore, Md., had under consideration a suitable location for a factory building to employ 200 men in the manufacture of a typemaking machine. The following officers were elected: Charles B. Mann, president; Geo. A. Boyden, first vice president; John E. Hanrahan, second vice president; William A. Tottle, treasurer; Charles B. Mann, Jr., secretary; Frank H. Brown, manager.

A foundry addition has been erected at the shops of the Central Pacific railroad at Sacramento, Cal.

The Modern Iron Works, Quincy, Ill., will buy a second hand drill press to bore up to 3 inches; also an engine lathe of medium size.

G. B. Essex Brass Co., Detroit, Mich., will buy a second hand automatic screw machine for ⅜-inch rods.

The new plant of the Schofield Steel Wheel & Wagon Co., Pueblo, Col., will begin operations June 1. Enough advance orders have been secured to keep 200 men busy for some months. All of the power for the plant will be supplied by an electric generator of 100-h. p. The main building will include, besides the engine and dynamo room, the offices and draughting rooms, the main shop, 300x80 feet.

The Jackson Iron & Tin Plate Co., Clarksburg, W. Va., has been delayed in the erection of its plant, largely on account of the buildings, and instead of getting the plant under way Jan. 1, as expected, will probably not start before the latter part of June. Instead of four sheet mills and three tin mills, as originally contemplated, there will be eight tin mills, and no sheets will be made. The company expects to buy steel in the open market.

Fires and Accidents:—

The building at Canal and West Washington streets, Chicago, in which were located the firms of J. H. Dawson Machinery Co., John Wishart Machinery Co., Rhodes Watch Tool Co., Connell & Bennett Metal Co., and the Eureka Iron Co., was destroyed by fire last week, causing a loss among the different firms, amounting to $10,000.

Fire in Brooklyn, N. Y., April 13 destroyed the foundry of David W. Binns, 50 Sanford street.

New Construction:—

The Dietz Machine Tool Co., Cincinnati, O., will erect a two-story plant at a cost of $3,500.

A large portion of the funds recently secured in the increasing of the capital of the Page Woven Wire Fence Co. will be spent in enlarging the Monessen, Pa., plant and the plant at Adrian, Mich. The Morgan Construction Co., of Worcester, Mass., is extending the wire plant at Monessen so as to provide a daily output of 200 tons and the rod mill capacity is be-

ing accordingly increased. Twenty-one woven wire machines are also being added to the plant, while at Adrian 50 new machines are being installed.

The building which will house the electric light and power plant of the St. Louis Exposition will be one of the largest on the grounds. It will be 1,000 feet long and 525 feet wide. A traveling crane with a span of 80 feet and running the entire length of the building will be installed to facilitate the erection of the machinery. A switchboard 107 feet long will also be built.

The Western Gas Construction Co., Fort Wayne, Ind., is building an addition to its foundry.

W. S. Cumming, 1121-1123 West Twenty-first street, Chicago, has taken out a city permit for the erection of a foundry building.

The Western Foundry Co., Chicago, is having plans prepared for the erection of a foundry, 210x110 feet, to be erected at Albany avenue and Thirty-sixth street, to cost $20,000.

The Lombard Iron Works & Supply Co., Augusta, Ga., has increased its plant by the erection of an addition to its boiler department, 110x220 feet, and by the installation of new machinery.

The Lee & Hoff Mfg. Co., St. Paul, Minn., will erect a building 48x106 for the manufacture of elevators. The building will be located on the corner of Fillmore street and Livingstone avenue.

The G. H. Hammond Co., Hammond, Ind., has had plans prepared for a large packing plant to be built in Chicago. Among the buildings to be erected are a boiler house, 123x162 and machine shop, 48x70. Permits have been taken out for the erection of the plant.

The Bettendorf Axle Co., Davenport, Iowa, whose plant was destroyed by fire some weeks ago, has decided to rebuild at Gilbertown, Iowa, east of the city limits of Davenport. The main building of the shops will be 240x700 feet.

The Metcalf Mfg. Co., Quincy, Pa., will erect a new foundry adjoining its plant. It will be 42x84 feet.

The Rock River Machine Co., Janesville, Wis., whose plant was destroyed by fire several weeks ago, will rebuild on a larger scale.

The H. W. Johns-Manville Covering Co., Milwaukee, Wis., will erect a large mill for the manufacture of asbestos paper. It will be 75x300 feet, two stories high.

Edward Langenbach, who has been prominent in the project to build a blast furnace at Canton, O., says that the furnace will be built on the south shore of Lake Erie, and that Pittsburg and Cincinnati interests have joined with the Canton parties so that the latter have now only a minority interest. Of the stock to be subscribed $800,000 has already been taken. It is expected to spend $1,000,000 on the plant.

The Mechanics' Machine Co. will erect a large stone building at Rockford, Ill., and will embark extensively in the manufacture of gas engines and other machinery.

Improvements aggregating nearly $500,000 have been planned by the Santa Fe railroad for its California lines. The company has already secured land at San Bernardino, Cal., adjoining its present shops to be used for new buildings. The cost of new car shops will be $40,000; paint shops, $27,000; transfer tables, $10,000; additions to the boiler shops, $4,500; new machinery, $31,000; brass foundry, $3,500; tracks, $16,000; steam and sewer pipes, $10,000; engine hoist, $5,800.

The Cope Pattern Works will build an addition to their factory at No. 36 Brush street, Detroit, Mich. It will be 31x50 feet in size and cost $2,500.

An additional story will be built to the factory of the Northwestern Foundry & Supply Co., of Detroit, Mich., at a cost of $3,000.

M. M. Lewis & Sons have begun the erection of a machine shop for the Advance Thresher Co., at Battle Creek, Mich. The structure will cost $4,000.

A gas stove works will probably be located in Kankakee, Ill. It is intended to have a six-acre site and buildings to cost some $10,000. Plans call for three buildings, the largest 200x70 feet. Address William Fraser.

The George H. Hammond Co., of Chicago, will erect a large packing plant which will include a machine shop, one story, 48x70 feet, to cost $1,500.

The Saco & Pettee Co., operating machine shops at Boston, Mass., and Newton Upper Falls, Mass., contemplates additions to one of its plants to cost about $200,000. If the city of Boston will grant some concessions in the way of taxation the plant will be built there.

The New Jersey Zinc & Iron Co., Palmerton, Pa., contemplates big additions to its plant. Two 70-foot furnaces to operate on spiegeleisen are to be built and 96 oxide furnaces.

The Fargo Car Wheel and Iron Co., Fargo, N. D., will erect a new plant 100x400 feet.

Lee & Hoff, St. Paul, Minn., will build an extensive addition to their machine shop. It will be of brick, two stories and basement, and will be 116 feet long and 48 feet wide. A large amount of new machinery will be installed.

The Cope Pattern Works, Detroit, Mich., manufacturers of stove patterns, will erect a three-story addition 31x53 feet.

The Western Tube Co., Kewanee, Ill., has plans prepared for the erection of a machine shop 238 feet long and 128 feet wide. A large amount of tube fitting machinery is to be installed.

The Northwestern Foundry & Supply Co., Detroit, Mich., will build a large addition to their foundry.

The Pomona Manufacturing Co., Pomona, Cal., will equip an abandoned pipe plant at that place, 65x160 feet, for foundry purposes.

The Reading Iron Co., Reading, Pa., will build an additional pipe mill for manufacturing 20-inch pipe.

The Pittsburg District:—

The Carnegie Sheet Steel Co. has awarded contracts for the erection of its new sheet mill to be erected at Carnegie, Pa. The Fort Pitt Bridge Co. has the contract for the erection of the buildings and the six sheet mills will be installed by the Gruson Iron Works of Philadelphia, Pa. It has been decided to erect one 40-ton open-hearth furnace, but plans will be prepared so that a second furnace can be installed if required.

The H. Adler Manufacturing Co. has purchased the Speer Plow Works foundry at West Carnegie and will equip it for the manufacture of gas stoves, ranges and gas appliances.

The Pennsylvania Railroad Co. will built a new double track bridge across the Monongahela river at Port Perry, Pa., to replace the present single track structure. The bridge will be 1,200 feet long and the channel span will be 400 feet in length and the clearances 55 feet. The bridge will connect the Union railroad of the Carnegie Steel Co. with the Pittsburg, McKeesport and Youghiogheny railroad. About 2,500 tons of steel will be required in its erection.

The Railway Steel Casting Co., of Pittsburg, will apply for a Pennsylvania charter on April 29 to conduct a foundry for the production of railway castings. G. W. Eisenbeis, C. C. Smith and J. W. Anderson are the incorporators.

The Keystone Valve & Manufacturing Co. of Pittsburg will be granted a Pennsylvania charter on April 25 with a capitalization of $10,000. J. D. Riley, W. A. Larimer, W. H. McCulley, W. J. Simpson and S. McKay are the incorporators. A plant for the manufacture of valves will be erected with a capacity of 100 per day.

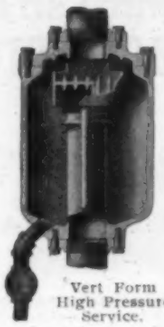
Officials of the Westinghouse Electric & Manufacturing Co. deny the report that they contemplate the erection of a plant at Lancaster, Pa.

McCance Bros. Co., recently incorporated with $50,000 capital, this week placed in operation their new galvanizing plant at 62d street and A. V. railway. The company also has a warehouse in which it will carry a full line of bars, hoops, bands and black and galvanized sheets. The company is in the market for bolt cutting machinery.

The Edgar Thomson Steel Works closed down last Saturday for a brief period to permit the making of much needed repairs. This is the first time in 28 years that this plant has been closed for any extended period outside of the Christmas shut down. The mill rolling light rails is to be equipped with a new engine, while the other mills are to have their engines extensively overhauled. The plant will be closed for less than a week.

The National Tube Co. has been awarded a contract for 120 miles of 16-inch pipe to be used in connecting the West Virginia gas belt with Toledo, O. This is one of the largest orders for pipe ever placed.

The American Bridge Co. has been awarded the contracts for the extension of a large number of bridges of the Buffalo, Rochester & Pittsburg railroad so as to permit of double tracking.



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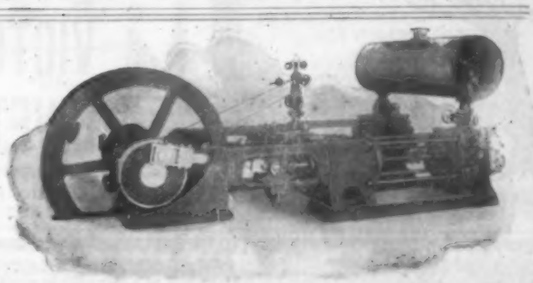

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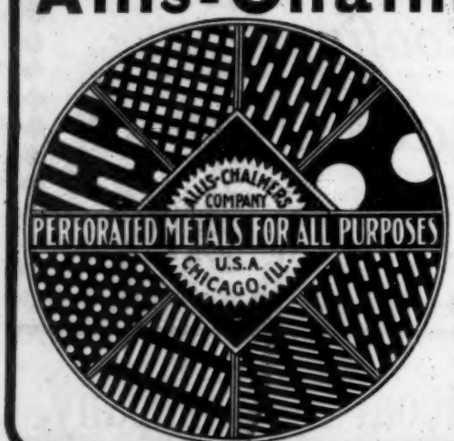

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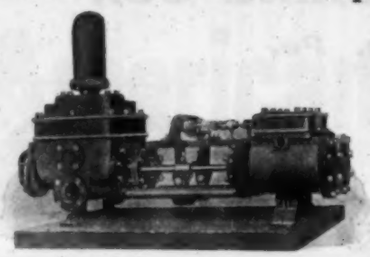

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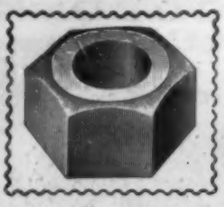

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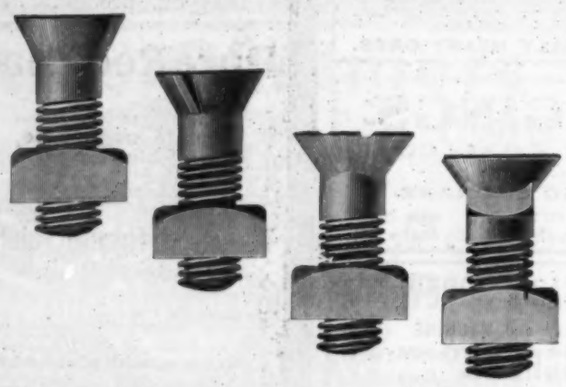

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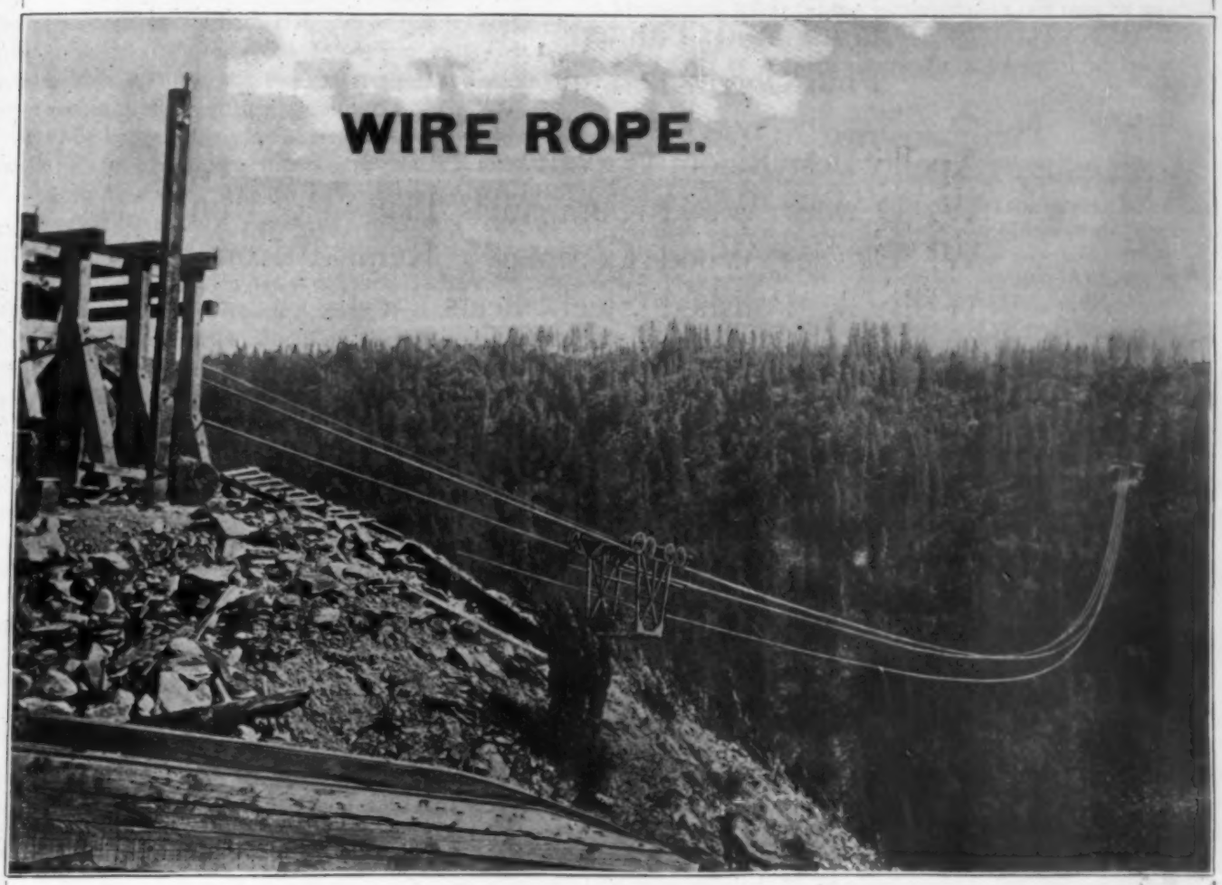

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